Importation of Fresh Fruit of Avocado (*Persea americana* Mill. var. 'Hass') from Mexico into the Continental United States, Hawaii, and Puerto Rico

A Qualitative, Pathway-Initiated Pest Risk Assessment

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Version 1

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Executive Summary

The Animal and Plant Health Inspection Service (APHIS) of the United States Department of Agriculture (USDA) prepared this risk assessment document to examine plant pest risks associated with importing commercially produced fresh fruit of avocado, *Persea americana* Mill. var. 'Hass' (Lauraceae), for consumption from Mexico into the continental United States, Hawaii, and Puerto Rico. Based on the market access request from Mexico, we considered the pathway to include the currently required systems approach for shipping restrictions, safeguards, municipality requirements, orchard and grower requirements, packinghouse requirements, certification, pest detection, and inspection as described in 7 CFR § 319.56-30 (2011). All processes and conditions considered during the risk assessment process become mandatory conditions for entry of the commodity.

Based on the scientific literature, port-of-entry pest interception data, and information from the government of Mexico, we developed a list of all potential pests with actionable regulatory status for the continental United States, Hawaii, and Puerto Rico that are known to occur in Mexico and known to be associated with the commodity anywhere in the world. From this list, we identified and further analyzed the organisms that have a reasonable likelihood of being associated with the commodity following harvesting from the field and prior to any post-harvest processing.

Of the pests selected for further analysis, we determined that the following are *not* candidates for risk management, because no endangered area exists within the continental United States, Hawaii, and Puerto Rico: *Paracoccus marginatus* (Hemiptera: Pseudococcidae), *Philephedra lutea* (Hemiptera: Coccidae), and *Thrips palmi* (Thysanoptera: Thripidae).

Commerical consignments of 'Hass' Avocadoes are already are permitted into the continental United States, Hawaii, and Puerto Rico from the Mexican state of Michoacan (only) under a systems approach (7 CFR § 319.56-30, 2011). The current systems approach used in Mexico specifically addresses the following insects: *Conotrachelus aguacatae, C. perseae, Copturus aguacatae, Heilipus lauri* (Coleoptera: Curculionidae), and *Stenoma catenifer* (Lepidoptera: Oecophoridae) (7 CFR § 319.56-30, 2011). Given that, we found a Negligible overall likelihood of introduction for those insects. Expanding the region from which exports are permitted in Mexico is not likely to alter the effectiveness of the mitigations. Given similar biology and impacts to the above listed pests, we also gave the following pests Negligible risk ratings: *Conotrachelus serpentinus* (Coleoptera: Curculionidae), *Cryptaspasma perseana* (Lepidoptera: Tortricidae). These pests—*Conotrachelus serpentinus* for Hawaii and Puerto Rico; *Cryptaspasma perseana* for Continental United States, Hawaii, and Puerto Rico—should be included for inspection, cutting and culling in the CFR.

We rated *Phytophthora citricola* and *P. heveae* (Oomycetes: Pythiales) as Negligible because infected fruits are highly likely to be removed from the pathway by the post-harvest practices. We determined that the following pests are candidates for risk management, because they **met the threshold to likely cause unacceptable consequences of introduction**, and they received an overall **likelihood of introduction** risk rating **above** Negligible.

Pest type	Taxonomy	Scientific name	Likelihood of Introduction overall rating
Arthropods	Hemiptera: Pseudococcidae	*Maconellicoccus hirsutus* (Green)	Medium
	Thysanoptera: Phlaeothripidae	*Pseudophilothrips perseae* (Watson)	Medium
	Thysanoptera: Thripidae	*Scirtothrips aceri* (Moulton)	Low
		Scirtothrips perseae Nakahara	Low
Fungi	Ascomycetes: Myriangiales	*Sphaceloma perseae* Jenkins	Low
Viroid	N/A	Avocado sunblotch viroid	Low

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are part of the pest risk management phase within APHIS and we did not address them in this document.

Table of Contents

1. Introduction

1.1. Background

This document was prepared by the Plant Epidemiology and Risk Analysis Laboratory of the Center for Plant Health Science and Technology, USDA Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ), to evaluate the risks associated with the importation of commercially produced fresh fruit of avocado (*Persea americana* Mill. var. 'Hass') for consumption from Mexico into the continental United States, Hawaii, and Puerto Rico.

The International Plant Protection Convention (IPPC) provides guidance for conducting pest risk analyses. The methods used here are consistent with guidelines provided by the IPPC, specifically the International Standard for Phytosanitary Measures (ISPM) on "Pest Risk Analysis for Quarantine Pests" (IPPC, 2011). The use of biological and phytosanitary terms is consistent with the "Glossary of Phytosanitary Terms" (IPPC, 2012).

Three stages of pest risk analysis are described in international standards: Stage 1, Initiation; Stage 2, Risk Assessment; and Stage 3, Risk Management. This document satisfies the requirements of Stages 1 and 2.

This is a qualitative risk assessment. We express the risk based on qualitative ratings for the likelihood and consequences of pest introduction via the imported avocado fruit from Mexico. The details of the methodology and rating criteria are found in the *Guidelines for Plant Pest Risk Assessment of Imported Fruit and Vegetable Commodities, Version 6.0* (PPQ, 2012).

The appropriate risk management strategy for a particular pest depends on the risk posed by that pest. Identification of appropriate phytosanitary measures to mitigate pest risk is undertaken in Stage 3 (Risk Management) and is not covered in this risk assessment. Risk management will be specified in a separate document.

1.2. Initiating event

The importation of fruits and vegetables for consumption into the United States is regulated under Title 7 of the Code of Federal Regulations, Part 319.56 (7 CFR §319.56) (2012). At this time, commercial consignments of 'Hass' avocados are permitted into the continental United States, Hawaii, and Puerto Rico ONLY from the Mexican state of Michoacan (municipalities: Acuitizio, Apatzingan, Ario, Cotija de la Paz, Erongaricuaro, Hidalgo, Irimbo, Los Reyes, Madero, Nuevo Parangaricutiro, Paracuaro, Periban, Salvador Escalante, Tacambaro, Tangamandapio, Tancitaro, Taretan, Tingambato, Tinguindin, Tocumbo, Turicato, and Tuxpan) (7 CFR § 319.56-30, 2011; APHIS, 2013). This assessment was prepared in response to a request from Mexico to change the Federal Regulation to expand the current export region to allow entry from the entirety of Mexico into the continental United States, Hawaii, and Puerto Rico.

1.3. Determination of the necessity of a weed risk assessment for the commodity

In some cases, the imported commodity may have the potential of becoming invasive in the pest risk analysis (PRA) area. The likelihood that this may happen is evaluated in a weed risk assessment, conducted separately from the commodity risk assessment.

Weed risk assessments do not need to be conducted for plant species that are widely established (native or naturalized) or cultivated in the PRA area, for commodities that are already enterable into the PRA area from other countries, or when the plant part(s) cannot easily propagate on their own or be propagated. We determined that a weed risk assessment is not needed for avocados because avocados are cultivated and grown in the continental United States, Hawaii, and Puerto Rico and are enterable from other countries (NRCS, 2013; APHIS, 2013).

1.4. Description of the pathway

The IPPC (2012) defines a pathway as "any means that allows the entry or spread of a pest." In the context of commodity pest risk assessments, the *pathway* is the commodity to be imported, together with all the processes the commodity undergoes that may have an impact on pest risk. In this risk assessment, the specific pathway of concern is the importation of fresh fruit of avocados (*Persea americana* Mill. var. 'Hass') for consumption from Mexico into the continental United States, Hawaii, and Puerto Rico; the movement of this commodity provides a potential pathway for the introduction and/or spread of plant pests. The United States and Mexico have agreed on a systems approach to be used for the importation of avocados from Michoacan (7 CFR § 319.56-30, 2011) that is applicable to the potential expansion of the export region as assessed in this document.

The following description of this pathway focuses on the conditions that may affect plant pest risk, including morphological and physiological characteristics of the commodity, as well as processes the commodity will undergo from production in Mexico through importation and distribution in the continental United States, Hawaii, and Puerto Rico. These conditions provided the basis for creating the pest list and assessing the likelihood of introduction of the pests selected for further analysis; therefore, all components of the pathway, as they are described below, should be considered mandatory conditions for importation of the commodity.

1.4.1. Description of the commodity

The commodity for import is the fresh fruit of *Persea americana* Mill. var. 'Hass' for consumption. Avocado trees are generally 30-60 feet tall, and considered "almost" evergreen (Morton, 1987b). Fruit is pear-shaped and 3-13 inches long and up to 6 inches wide. Skin color varies from yellow-green to nearly black and may be smooth or pebbled. Flesh is generally pale to rich-yellow, buttery and bland or nutlike in flavor. Each fruit contains a single seed 2-2.5 inches in diameter that is hard and heavy (Morton, 1987b).

1.4.2. Production and harvest procedures in the exporting area

As described in 7 CFR § 319.56-30 (2011), specific safeguards must be adhered to in Mexico. Municipalities from which avocados are to be shipped must be listed as and approved municipality in the bilateral work plan provided to APHIS by the Mexican national plant

protection organization (NPPO). Surveys must be conducted at least semiannually (inclusive of once during the wet season and once during the dry season). The municipalities must be found free of the large avocado seed weevil *Heilipus lauri*, the avocado seed moth *Stenoma catenifer*, and the small avocado seed weevils *Conotrachelus aguacatae* and *C. perseae*. Trapping for *Ceratitis capitata* must take place, and any findings reported to APHIS. Specific orchards and growers must be registered with the Mexican NPPO's avocado export program and listed as an approved orchard or grower. Requirements specific to the orchards include:

(i) The orchard and all contiguous orchards and properties must be surveyed semiannually and found to be free from the avocado stem weevil *Copturus aguacatae*;
(ii) Avocado fruit that has fallen from the trees must be removed from the orchard at least once every seven days and may not be included in field boxes of fruit to be packed for export;
(iii) Dead branches on avocado trees in the orchard must be pruned and removed from the orchard;
(iv) Harvested avocados must be placed in field boxes or containers of field boxes that are marked to show the official registration number of the orchard. The avocados must be moved from the orchard to the packinghouse within 3 hours of harvest or they must be protected from fruit fly infestation until moved;
(v) The avocados must be protected from fruit fly infestation during their movement from the orchard to the packinghouse and must be accompanied by a field record indicating that the avocados originated from a certified orchard.

If any of the above-listed pests are found during surveys, the Mexican NPPO must immediately take measures to isolate and eradicate the pest. Affected orchards will immediately lose their export certification until APHIS and the Mexican NPPO agree that eradication measures have been effective.

1.4.3. Packinghouse procedures in the exporting area

Specific packinghouse procedures have been listed in 7 CFR § 319.56-30 (2011) and relevant sections relayed here. Packinghouses must be registered as an approved packinghouse in the annual work plan provided to APHIS from the Mexican NPPO. When avocados are being prepared for shipment to the United States (inclusive of Hawaii and Puerto Rico), fruit is only accepted from orchards certified by the Mexican NPPO. The packinghouse must have all openings to the outside covered by screening with openings of 1.6 mm or less, or some other insect prevention barrier, as well as double doors at the entrance to the facility and at the interior entrance to the area where avocados are packed. Prior to culling, a biometric sample of avocados per consignment must be selected, cut, and inspected by the Mexican NPPO or approved designee and found free of pests. The identity of the avocados must be maintained on field boxes or containers in order to allow for tracebacks if pests are found at the packinghouse or U.S. ports of entry. Prior to packing, each avocado must be cleaned of all stems, leaves, and other extraneous plant parts and labeled with a sticker bearing the official registration number of the packinghouse.

1.4.4. Shipping and storage conditions

Avocados must be packed in clean, new boxes or bulk shipping bins, or in clean reusable crates and clearly marked with the identity of the grower, packinghouse, and exporter. A lid, insect-

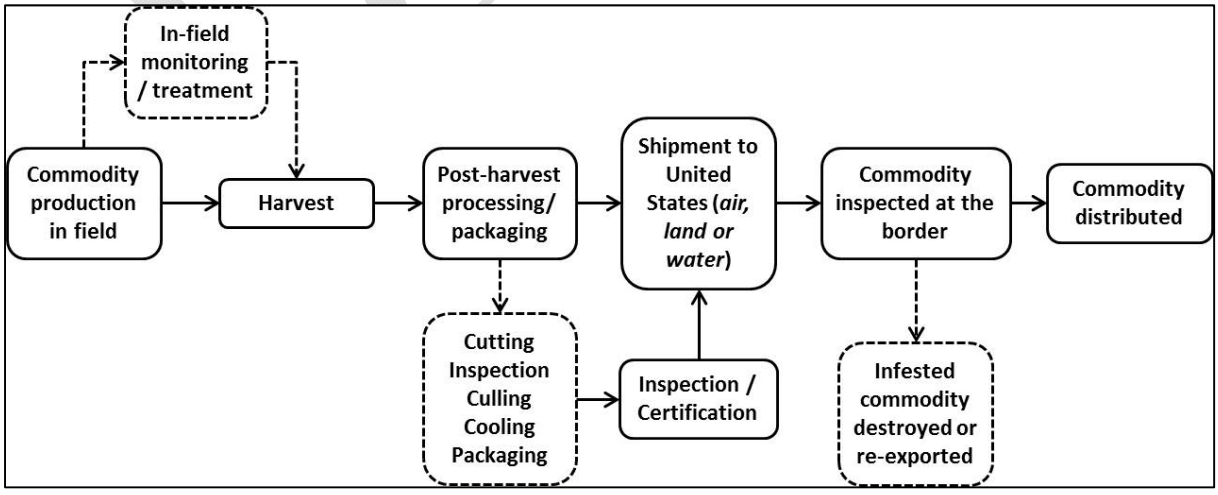
proof mesh, or other material must protect avocados from reinfestation of pests after leaving the packinghouse. A sealed refrigerated truck or container must be used to transport avocados to the port of export. All consignments must be accompanied by a phytosanitary certificate issued by the NPPO of Mexico certifying that the conditions specified in 7 CFR § 319.56-30 have been met. Specific shipping and storage conditions have not been indicated; however, general information for shipment of 'Hass' avocados includes shipment at 7 °C, with a relative humidity of 85-90 percent. Chilling injury is likely at or below 4 °C (McGregor, 1987). Consignments may arrive at land borders or ocean containers through air or sea (7 CFR § 319.56-30, 2011; PPQ, 2011).

1.4.5 Inspection procedures at U.S. ports of entry

On arrival at U.S. ports of entry, Mexican avocados are subject to inspection and general requirements of 7 CFR 319.56-3 (APHIS, 2013). Inspection of avocados from Michoacan, Mexico must follow specific inspection procedures (PPQ, 2011). Specific listed pests of concern include avocado stem weevil (*Copturus aguacate*), avocado seed moth (*Stenoma catenifer*), fruit flies (*Anastrepha* spp.), large avocado seed weevil (*Helipus lauri*), and small avocado seed weevils (*Conotrachelus aguacate* and *C. perseae*). Consignments must be in sealed containers and accompanied by both an APHIS import permit and a Mexican Phytosanitary Certificate. The certificate must have the Additional Declaration that "The avocados in this consignment meet the requirement of 7 CFR 319.56-30." Individual boxes or shipping bins must be clearly marked with the identity of the grower, packinghouse, and exporter, and covered with pestproof packaging. At land ports, 300 avocados should be selected for cutting and inspection. Thirty avocados from 1 out of every 10 ocean containers must be cut and inspected. Additional inspections will be required if actionable pests are found. Fruit should be inspected for pest damage. Stems longer than ¼ inch should be cut lengthwise and inspected. No more than five of the 30 avocados are permitted to have stems longer than ½ inch. Fruit should be thinly sliced and inspected for fruit flies, and the seed should be sliced open for signs of seed weevils. Additional specific information may be found in the special inspection procedures (PPQ, 2011).

1.4.6. Summary of the pathway

The figure below summarizes the pathway of concern: the importation of fresh fruit of avocado (*Persea americana* Mill. var. 'Hass') for consumption from Mexico into the continental United States, Hawaii, and Puerto Rico.



2. Pest List and Pest Categorization

In this section, we identify the plant pests with actionable regulatory status for the continental United States, Hawaii, and Puerto Rico that could potentially become established in the continental United States, Hawaii, and Puerto Rico as a result of the importation of avocados from Mexico, and we determine which of these pests meet the criteria for further analysis. Pests are considered to be of regulatory significance if they are actionable at U.S. ports-of-entry. Actionable pests include quarantine pests, pests considered for or under official control, and pests that require evaluation for regulatory action.

2.1. Pests considered but not included on the pest list

2.1.1. Rarely intercepted pests

The following pests were intercepted at U.S. ports-of-entry on avocados from Mexico; however, they have been intercepted less than five times since 1985 (PestID, 2011) and are not considered likely to be normally associated with commercially produced avocados from Mexico: *Ahasverus advena, Aleurocerus palmae, Amboria* sp., *Anomala* sp., *Ataenius* sp., *Calcisuccinea* aff. *luteola, Capaneus tetricus, Chalcodermus* sp., *Cyclocephala* sp., *Dallasiellus* sp., *Diabrotica porracea, Diplotaxis* sp., *Dyscinetus* sp., *Elsinoe* sp., *Empoasca* sp., *Estigmene* sp., *Gryllus* sp., *Ligyrus* sp., *Luperosoma* sp., *Myochrous* sp., *Pachybrachius* sp., *Phyllophaga* sp., *Physorhinus* sp., *Pityophthorus* sp., *Planococcus halli, Polymerus* sp., *Sphaceloma psidii,* and *Trichoplusia ni.* If additional interceptions occur or we find new reports of this association in the literature, we may reevaluate this association and subsequent risk.

2.1.2. Pests with weak evidence for association with the commodity or for presence in the export area

***Anastrepha* species and *Ceratitis capitata* (Wiedemann):** Historically, the risk of introducing *Anastrepha* species and *Ceratitis capitata* into the United States was one of the greatest concerns related to the importation of Mexican avocados. Recent laboratory and field experiments determined that uninjured, commercially produced 'Hass' avocados in Mexico do not serve as hosts for the *Anastrepha ludens, A. serpentina, A. striata,* and *A. obliqua* or *Ceratitis capitata* (Wiedemann) (Aluja et al., 2004; De Graaf, 2009; SENASA, 2010; Willink and Villagran, 2007). These results, in conjunction with sampling of very large quantities of imported Hass avocados over an extended period without any findings of *Anastrepha* spp. larvae or *Ceratitis capitata* (Wiedemann), led APHIS-PPQ to conclude that the 'Hass' avocado, when harvested and safeguarded according to the parameters of the current systems approach for 'Hass' avocados from Mexico (7 CFR § 319.56, 2011), is not a host to *Anastrepha* spp. fruit flies or *Ceratitis capitata* (Wiedemann). Consequently, *Anastrepha* spp. fruit flies and *Ceratitis capitata* (Wiedemann) were not included on this pest list.

***Ceroplastes rubens* Maskell:** Dekle (2008) reports that *C. rubens* is present in Mexico, but we found no other corroborating reports. This was insufficient evidence for its presence in Mexico, so we did not include this pest on the pest list.

***Ceroplastes stellifer* Westwood (=*Vinsonia stellifera* Westwood):** The main source used for reference of this pest on avocado stems was ScaleNet (Ben-Dov et al., 2013), which cites a list of

pests associated with various host plants in the western Indian Ocean as published by Mamet, 1943). An extensive literature search did not reveal any additional or more recent records of this species occurring in association with avocado in the field. Therefore, we did not include it on the pest list.

***Dysmicoccus neobrevipes* Beardsley**: A recent publication by Wright (2011) corrected a single, older report that *D. neobrevipes* was associated with *P. americana.* Based on that information, we did not include this pest on the pest list.

***Neosilba pendula* Bezzi:** Records of *N. pendula* in Mexico could not be confirmed (e.g., CABI, 2013; Maes, undated), despite extensive research conducted in central and south American regions. In addition, extensive studies of the field host plants for *N. pendula* in Brazil by Uchoa and Nicacio (2010) did not find any avocado infestations by this fruit fliy. Therefore, it is not included on the pest list.

***Nipaecoccus viridis* Westwood:** Erroneous reports that *N. viridis* is present in Mexico or anywhere in the world (e.g., Ben-Dov et al., 2010) were corrected recently by Williams and Miller (2010). Therefore, we did not include this pest on the pest list.

***Pulvinaria simulans* Cockerell:** This pest is included in a "Check list of the avocado pests of the world" (Ebeling, 1959). However, an extensive literature search did not find any more recent or primary literature indicating that *P. simulans* may be found infesting avocados in the field. Therefore, we did not include this pest on the pest list.

***Tetraleurodes truncatus* Sampson & Drews:** *Persea americana* is listed as a host plant for *T. truncatus* by Evans (2007) based on the records from the Whitefly Taxonomic and Ecological Database. However, this publication does not provide any references indicating the status or origin of the information. An extensive literature search did not reveal any primary sources indicating that *T. truncatus* may be a pest of avocado in the field. Therefore, we did not include it on the pest list.

***Xylella fastidiosa*:** *Xylella fastidiosa* is reported in Mexico and the United States (CABI/EPPO, 2006) and has been reported once on avocado (Montero-Astúa et al., 2008); however, it was not listed in the pest list because there are many strains of *X. fastidiosa* (CABI, 2011a). The record of *X. fastidiosa* occurring on avocado was from Costa Rica (Montero-Astúa et al., 2008). It is not known if the strain occurring in Costa Rica occurs in other parts of the world. The Costa Rica report says the strain found on avocado had 99 to 100 percent sequence identity to a Pierce's disease strain from California (Temecula1) and 94 to 95 percent to a citrus variegated chlorosis strain from Brazil (Found-5) (Montero-Astúa et al., 2008). If future studies suggest a strain different than what occurs in the United States occurs in Mexico on avocado, this pathogen will be re-evaluated for its risk to the United States.

2.1.3. Organisms identified only to the genus level

In commodity import risk assessments, the taxonomic unit for pests selected for evaluation beyond the pest categorization stage is usually the species (IPPC, 2011), as assessments focus on organisms for which biological information is available. Therefore, generally, we do not assess

risk for organisms identified only to the genus level, in particular if the genus in question is reported in the import area. Often there are many species within a genus, and we cannot know if the unidentified species occurs in the import area and, consequently, whether it has actionable regulatory status for the import area. On the other hand, if the genus in question is absent from the import area, any unidentified organisms in the genus can have actionable status; however, because such an organism has not been fully identified, we cannot properly analyze its likelihood and consequences of introduction.

In light of these issues, we usually do not include organisms identified only to the genus level in the main pest list. Instead, we address them separately in Appendix A. The information can be used by risk managers to determine if measures beyond those intended to mitigate fully identified pests are warranted. Often, however, the development of detailed assessments for known pests that inhabit a variety of ecological niches, such as internal fruit feeders or foliage pests, allows effective mitigation measures to eliminate the known organisms as well as similar but incompletely identified organisms that inhabit the same niche.

One organism, *Colletotrichum boninense* Moriwaki, Toy. Sato & Tsukib, was identified to the species level. However, recent taxonomic work by Damm et al. (Damm et al., 2012) found C. boninense to be a large species complex ({Damm, 2012 #289), and the species *boninense* is no longer associated with the pathogen reported from avocado in Mexico (Silva-Rojas and Avila-Quezada, 2011) and may very well be a species already present in the United States. Damm reported that "ITS sequences of endophytic strains of….*C. boninense* isolates from *Persea Americana* from Mexico (Silva-Rojas and Avila-Quezada, 2011)…and *Passiflora* sp. in Florida, USA (Tarnowski & Ploetz, 2010) are identical or similar to those of *C. karstii* (and *C. phyllanthi*)" (Damm et al., 2012). *Colletotrichum karstii* is reported from the United States (Tarnowski and Ploetz, 2010). Due to the uncertainty of the identity of this organism, we cannot assess its risk. If new information indicates that it is a species not present in the United States, its risk will be re-evaluated. No *Colletotrichum* species have been intercepted in permit cargo from Mexico (PestID, 2013).

2.2. Pest list

In Table 1, we list pests associated with avocado that occur in Mexico. The list comprises pests that occur in Mexico on any host and are reported to be associated with avocado, whether in Mexico or elsewhere in the world. For each pest, we indicate 1) the part of the imported plant species with which the pest is generally associated, and 2) whether the pest has a reasonable likelihood of being associated, in viable form, with the commodity following harvesting from the field and prior to any post-harvest processing. We developed this pest list based on the scientific literature, port-of-entry pest interception data, and information provided by the government of Mexico. Pests in shaded rows are pests identified for further evaluation, as we consider them reasonably likely to be associated with the harvested commodity; we summarize these pests in a separate table (Table 2). Please note that in the pest list, we do not provide information on plant part association and whether the pest is likely to follow the pathway for non-actionable pests. Even if non-actionable pests are able to follow the pathway, phytosanitary measures against these pests would not be justified because they already occur in the import area. Therefore, for non-actionable pests we indicate that information with N/A (not applicable).

Table 1. Pests reported on *Persea americana* Mill. (in any country) and present in Mexico (on any host).

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
ARTHROPODS					
Acari: Eriophyidae					
Calepitrimerus muesebecki Keifer	MX (Estrada-Venegasa et al., 2002), CONUS (Ebeling, 1959)	Ebeling, 1959	CONUS: No HI, PR: Yes	L (Jeppson et al., 1975)	No
Acarina: Tarsonemidae					
Polyphagotarsonemus latus Banks (= *Hemitarsonemus latus* Banks)	MX (de Cross et al., 2010), US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Acarina: Tenuipalpidae					
Brevipalpus californicus Banks (= *B. australis* Baker[6])	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Brevipalpus phoenicis (Geijskes)[6]	MX, US (EPPO, undated)	Childers et al., 2003	**No**	N/A	N/A
Acarina: Tetranychidae					
Allonychus littoralis (McGregor)	MX (Migeon and Dorkeld, 2006)	Migeon and Dorkeld, 2006	Yes	L (Posada Ocohoa, 1989)[7]	No

[1] Geographic Distribution: MX = Mexico, US = United States, CONUS = continental United States, HI = Hawaii, PR = Puerto Rico, FL = Florida, CA = California, GA = Georgia, LA = Louisiana, MD = Maryland, MS = Mississippi, NC = North Carolina, TX = Texas, NJ = New Jersey, AZ = Arizona, NV = Nevada, OR = Oregon (Individual U.S. states are listed only if the pest species is considered an actionable pest for the United States.)

[2] Brackets [ ] around the status designation indicate that the pest has a limited distribution in the import area (continental United States, Puerto Rico, and/or Hawaii) and is either under official control or under consideration for official control.

[3] Entries in bold indicate answers based on reportable/non-reportable status in PestID (2013); non-bolded answers are based on distribution records found.

[4] For the non-actionable pests in Table 1 we put N/A (= Not Applicable) in the columns for "Plant Part(s) Association" and "Follow Pathway." See discussion in section 2.1 for more information.

[5] Plant parts: Br = Branch, Fl = Flower, F = Fruit, I = Inflorescence, L = Leaf, R = Root, Sd = Seed, S = Stem, and T = Trunk. N/A = Not Applicable

[6] Species of *Brevipalpus* mites can vector citrus leprosis, which occurs in Mexico (CABI, 2011a). If intercepted on citrus, mites are treated as vectors of this disease as they could continue feeding on the lesions. Avocado, however, is not a host of this disease and we do not expect the pathogen to be transmitted by mites previously feeding on citrus since leprosis is non-persistent circulative in a vector.

[7] Based on information for *Allonychus* sp. (Posada Ocohoa, 1989).

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Eotetranychus sexmaculatus (Riley)	MX (MacGregor and Gutierrez, 1983), CONUS (Ebeling, 1959), HI (Migeon and Dorkeld, 2013)	Ebeling, 1959	CONUS, HI: No PR: Yes	L (Steven, 2004)	No
Eotetranychus tremae De Leon	MX, CONUS (Bolland et al., 1998)	Bolland et al., 1998	CONUS: No HI, PR: Yes	Leaf of other host plants (Flechtmann, 1996)	No
Oligonychus biharensis (Hirst)	MX (McDonald, undated-a)	McDonald, undated-a	**CONUS, PR: Yes HI: No**	L (McDonald, undated-a)	No
Oligonychus mcgregori (Baker & Pritchard)	MX (McDonald, undated-b)	McDonald, undated-b	**Yes**	L (Posada Ocohoa, 1989)	No
Oligonychus perseae Tuttle, Baker & Abbatiello	MX (Hoddle, 1998), US (Bolland et al., 1998)	Hoddle, 1998	**No**	N/A	N/A
Oligonychus peruvianus (McGregor)	MX (CABI, 2011a), US (Bolland et al., 1998)	CABI, 2011a	**No**	N/A	N/A
Oligonychus platani (McGregor)	MX (Bolland et al., 1998), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Oligonychus punicae (Hirst)	MX, US (Waite and Barrera, 2002)	Waite and Barrera, 2002	**No**	N/A	N/A
Oligonychus viridis (Banks)	MX, CONUS (Bolland et al., 1998), PR (Migeon and Dorkeld, 2013)	Bolland et al., 1998	CONUS, PR: No HI: Yes	L of other host plants (Jeppson et al., 1975)	No

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Oligonychus yothersi (McGregor)	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	**No**	N/A	N/A
Panonychus citri (McGregor)	MX, US (Bolland et al., 1998)	Bolland et al., 1998	**No**	N/A	N/A
Tetranychus gloveri Banks	MX, US (Bolland et al., 1998)	Bolland et al., 1998	**No**	N/A	N/A
Tetranychus mexicanus (McGregor)	MX, US (Bolland et al., 1998)	Bolland et al., 1998	**No**	N/A	N/A
Tetranychus tumidus Banks	MX, US (Jeppson et al., 1975)	Jeppson et al., 1975	**No**	N/A	N/A
Tetranychus urticae Koch	MX, US (Bolland et al., 1998)	Bolland et al., 1998	**No**	N/A	N/A
Acarina: Tydeidae					
Lorryia formosa Cooreman	MX (Jeppson et al., 1975), US (Muma, 1971)	Jeppson et al., 1975	**No**	N/A	N/A
INSECTA					
Coleoptera: Anthribidae					
Araecerus fasciculatus (De Geer)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Coleoptera: Bostrichidae					
Apate monachus Fabricius (= *A. monacha* F.)	MX (MacGregor and Gutierrez, 1983), PR (Martorell, 1976)	MacGregor and Gutierrez, 1983	**CONUS, HI: Yes** PR: No	S (CABI, 2011a)	No
Coleoptera: Cerambycidae					
Trachyderes succinctus ssp. *succinctus* (Linné)	MX (Maes et al., undated)	Maes et al., undated	**Yes**	S (Ploetz et al., 1994)	No

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Coleoptera: Chrysomelidae					
Deloyala guttata (Olivier)	MX (Ebeling, 1959), US (Rausher, 1984)	Ebeling, 1959	**No**	N/A	N/A
Diabrotica balteata Leconte	MX (CABI, 2011a), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Coleoptera: Curculionidae					
Caulophilus latinasus Say (= *C. oryzae* (Cyllenhal))	MX, US (McKenzie, 1935; CABI, 2011a)	McKenzie, 1935; CABI, 2011a	**No**	N/A	N/A
Conotrachelus aguacatae Barber	MX (MacGregor and Gutierrez, 1983)	MacGregor and Gutierrez, 1983	**Yes**	F, L (CABI, 2011a)	Yes
Conotrachelus perseae Barber	MX (Waite and Barrera, 2002)	Waite and Barrera, 2002	**Yes**	F (Waite and Barrera, 2002)	Yes
Conotrachelus serpentinus (Klug)	MX (Alfieri Jr. et al., 1984), CONUS (Menge and Ploetz, 2003; Alfieri Jr. et al., 1984)	Alfieri Jr. et al., 1984; Whitehead, 1979	CONUS: No HI, PR: Yes	F (Alfieri Jr. et al., 1984)	Yes
Copturomimus hustachei Hagedorn	MX (Waite and Barrera, 2002)	Waite and Barrera, 2002	Yes	S (Waite and Barrera, 2002)	No
Copturomimus perseae Hustache	MX (Waite and Barrera, 2002)	Waite and Barrera, 2002	Yes	S (Waite and Barrera, 2002)	No
Copturus aguacatae Kissinger	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	**Yes**	S (Waite and Barrera, 2002)	Yes
Copturus constrictus Champion	MX (McGuire and Crandall, 1967)	McGuire and Crandall, 1967	Yes	S (CABI, 2011a)	No

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Heilipus albopictus Champion	MX (MacGregor and Gutierrez, 1983)	MacGregor and Gutierrez, 1983	Yes	F, S (Castañeda-Vildozola et al., 2010)	No[8]
Heilipus lauri Bohemann	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	**Yes**	F, Sd (Waite and Barrera, 2002)	Yes
Pantomorus cervinus (Boheman)	MX, CONUS (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Rhynchophorus palmarum (Linnaeus)	MX (CABI, 2011a)	CABI, 2011a	**Yes**	F, Fl, L, S of various host plants (CABI, 2011a)	No[9]
Coleoptera: Scarabaeidae					
Cryptocarenus diadematus Eggers	MX (Wood, 1992), CONUS (Atkinson et al., 2010)	Wood, 1992	CONUS: No HI, PR: Yes	S (Atkinson et al., 2010)	No
Euphoria leucographa Gory & Percheron	MX (PestID, 2011), CONUS (Erwin and Ribeiro, 1996)	PestID, 2011	**No**	N/A	N/A
Macrodactylus mexicanus Burmeister	MX (Peña et al., 2002)	Peña et al., 2002	**Yes**	F, Fl, L (Aragón-García et al., 2010)	No[10]
Coleoptera: Scolytidae					
Araptus schwarzi (Blackman)	MX (Wood, 1992)	Wood, 1992	**No**	N/A	N/A
Cnesinus carinatus Wood	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No

[8] Adults of *Heilipus albopictus* may feed on the surface of the fruit, and larvae develop in stems and not fruit (Castañeda-Vildozola et al., 2010). They are considered highly unlikely to remain with the fruit through harvesting and processing.

[9] *Rhynchophorus palmarum* is highly unlikely to follow the pathway because adults are highly mobile and because it is primarily a pest of palms. Reports on other hosts are typically of adults feeding externally on ripe fruit (CABI, 2011a); those individuals are highly unlikely to remain with avocados through standard post-harvest processing.

[10] *Macrodactylus mexicanus* feeds on the surface of fruit (Aragón-García et al., 2010) and it is highly unlikely to remain with the fruit through harvesting and processing.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Cnesinus costulatus Blanford	MX (Atkinson and Martinez, 1985)	Atkinson and Martinez, 1985	Yes	S (Wood, 1992)	No
Cnesinus electinus Wood	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No
Cnesinus eostulatus Blandford	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No
Cnesinus gracilis Blandford	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No
Cnesinus myelitis Wood	MX (Atkinson and Martinez, 1985)	Atkinson and Martinez, 1985	Yes	S (Wood, 1992)	No
Cnesinus prominulus Wood	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No
Cnesinus pullus Blandford	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No
Cnesinus punctatus Blandford	MX (Wood, 1992)	Wood, 1992	Yes	S (Wood, 1992)	No
Corthylus comatus Blandford	MX (Bright and Skidmore, 1997)	Bright and Skidmore, 1997	Yes	S (Peña et al., 2002)	No
Corthylus nudus Schedl	MX (MacGregor and Gutierrez, 1983)	MacGregor and Gutierrez, 1983	Yes	S (Peña et al., 2002)	No
Corthylus papulans Eiehhoff	MX, CONUS (Wood, 1992)	Wood, 1992	CONUS: No HI, PR: Yes	S (Wood, 1992)	No
Hypothenemus gossypii (Hopkins)	MX, CONUS (Wood, 1992)	Wood, 1992	CONUS: No HI, PR: Yes	S (Atkinson and Peck, 1994)	No
Hypothenemus seriatus (Eiehhoff)	MX, US (Wood, 1992)	Wood, 1992	**No**	N/A	N/A
Microcorthylus vescus Wood	MX (Bright and Skidmore, 1997)	Bright and Skidmore, 1997	Yes	S (HYPP, undated)	N/A
Microcorthylus vicinus Wood	MX (Bright and Skidmore, 1997)	Bright and Skidmore, 1997	Yes	S (HYPP, undated)	N/A
Monarthrum pennatum (Schedl)	MX (Bright and Skidmore, 1997)	Bright and Skidmore, 1997	Yes	S (Noguera-Martinez and Atkinson, 1990)	No
Pagiocerus frontalis (Fabricius)	MX, US (Wood, 1992)	Wood, 1992	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Phloeocleptus atkinsoni Wood	MX (Atkinson and Martinez, 1985)	Atkinson and Martinez, 1985	Yes	S (Atkinson and Martinez, 1985)	No
Phloeocleptus caudatus Wood	MX (Bright and Skidmore, 1997)	Bright and Skidmore, 1997	Yes	S (Atkinson and Martinez, 1985)	No
Phloeocleptus cristatus Wood	MX (Atkinson and Martinez, 1985)	Atkinson and Martinez, 1985	Yes	S (Atkinson and Martinez, 1985)	No
Phloecleptus plagiatus Wood	MX (Atkinson and Martinez, 1985)	Atkinson and Martinez, 1985	Yes	S (Atkinson and Martinez, 1985)	No
Xyleborinus saxesenii (Ratzeburg)	MX, CONUS (CABI, 2011a)	CABI, 2011a	CONUS: No HI, PR: Yes	S (CABI, 2011a)	No
Xyleborus volvulus (Fabricius)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Xylosandrus morigerus (Blandford)	MX (CABI, 2011a)	CABI, 2011a	**Yes**	S, R (CABI, 2011a)	N/A
Diptera: Lonchaeidae					
Neosilba batesi Curran	MX (Aluja et al., 2004), US (Ahlmark and Steck, 1997)	Ahlmark and Steck, 1997	**No**	N/A	N/A
Diptera: Muscidae					
Atherigona orientalis Schiner	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Aetalionidae					
Aetalion quadratum Fowler	MX (Ebeling, 1959), US (NHM of LA, undated)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Aleyrodidae					
Aleurocanthus woglumi Ashby	MX (Whiley et al., 2002), CONUS (FL, TX) (Evans, 2008), HI (CABI, 2011a), PR (Evans, 2008)	Whiley et al., 2002	**[Yes]**	L, S (CABI, 2007)	No

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Aleurodicus coccolobae Quaintance & Baker	MX (Evans, 2008), CONUS (FL) (Hodges and Evans, 2005)	Evans, 2008	**[Yes]**	L (Miller et al., 2000)	No
Aleurodicus cocois Curtis	MX (CABI, 2011a), CONUS (FL) (Hodges and Evans, 2005), PR (Martorell, 1976)	CABI, 2011a	**[Yes]**	L (CABI, 2011a)	No
Aleurodicus dispersus Russell	MX, PR, HI (Evans, 2008), CONUS (FL) (CABI, 2011a)	Evans, 2008	**No**[11]	N/A	N/A
Aleurodicus dugesii (Cockerell)	MX (Ebeling, 1959), US (Evans, 2008)	Ebeling, 1959	**No**	N/A	N/A
Aleurodicus pulvinatus (Maskell)	MX (Evans, 2008)	Evans, 2008	**Yes**	L (CABI, 2011a)	No
Aleurodicus rugioperculatus Martin	MX, CONUS (FL) (EPICA, 2009)	EPICA, 2009	**[Yes]**	L (Miller et al., 2000)	No
Aleuroglandulus subtilis Bondar	MX (Evans, 2008), US (Dooley III et al., 2010)	Evans, 2008	**No**	N/A	N/A
Aleuropleurocelus abnormis (Quaintance)	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Aleurotrachelus trachoides (Back)	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Aleurothrixus floccosus (Maskell)	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Bemisia tabaci (Gennadius)	MX, US (CABI, 2011a)	Vasquez et al., undated	**No**	N/A	N/A

[11] No action on commodities for consumption (PestID, 2011).

Pest Scientific Name	**Distribution**[1]	**Host association**	**Actionable pest**[2,3]	**Plant part(s) association**[4,5]	**On harvested commodity?**
Bemisia tabaci (B biotype) (Gennadius) (= *B. argentifolia* (Bellows et al.))	MX, US (CABI, 2011a)	Pegg et al., 2002	**No**	N/A	N/A
Dialeurodes citri (Ashmead)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Dialeurodes denticulatus (Bondar) (= *D. michoacanensis*)	MX (Evans, 2008)	Evans, 2008	Yes	L (Fasula and Weems, 2010)[12]	No
Dialeurodes kirkaldyi (Kotinsky)	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Paraleyrodes goyabae (Goeldi)	MX (Teliz, 2000)	Teliz, 2000	Yes	L (Teliz, 2000)	No
Paraleyrodes minei Iaccarino	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Paraleyrodes perseae Quaintance	MX (Waite and Barrera, 2002), US (Ebeling, 1959)	Waite and Barrera, 2002	**No**	N/A	N/A
Paraleyrodes sp. near *goyabae* (Goeldi)	MX (Ebeling, 1959)	Ebeling, 1959	Yes	L (Posada Ocohoa, 1989)	No
Tetraleurodes perseae Nakahara	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Tetraleurodes quadratus Sampson & Drews	MX (Evans, 2008)	Evans, 2008	**Yes**	L (Miller et al., 2000)	No
Tetraleurodes ursorum (Cockerell)	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Trialeurodes abutiloneus (Haldeman)	MX, US (Evans, 2008)	Evans, 2008	**No**	N/A	N/A
Trialeurodes floridensis (Quaintance)	MX (Waite and Barrera, 2002), PR (Evans, 2008), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A

[12] Based on information available for *Dialeurodes citri.*

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Trialeurodes similis Russell	MX (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Trialeurodes vaporariorum (Westwood)	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Aphididae					
Aphis gossypii Glover	MX (CABI, 2011a), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Aphis spiraecola Patch	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Myzus persicae Sulzer	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Toxoptera aurantii (Fonscolombe)	MX (CABI, 2011a), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Asterolecaniidae					
Bambusaspis bambusae (Boisduval)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Hemiptera: Cicadellidae					
Idona minuenda (Ball)	MX (Peña et al., 2002), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Coccidae					
Ceroplastes ceriferus (Fabricius)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Ceroplastes cirripediformis Comstock	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Ceroplastes cistudiformis Townsend & Cockerell	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Ceroplastes floridensis Comstock	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Ceroplastes sinensis Del Guercio	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**[13]	N/A	N/A
Coccus hesperidum (L)	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Coccus longulus (Douglas)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Coccus viridis (Green)	MX, CONUS (Ben-Dov et al., 2010), HI (Zimmerman, 1948), PR (Martorell, 1976)	Ben-Dov et al., 2010	**No**	N/A	N/A
Eucalymnatus tessellatus (Signoret)	MX (Ben-Dov et al., 2010), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Kilifia acuminata (Signoret)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Milviscutulus mangiferae (Green) (= *Coccus mangiferae* Fernald)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Parasaissetia nigra (Nietner)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Parthenolecanium corni (Bouche)	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Parthenolecanium persicae (Fabricius)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A

[13] Action required for propagative material only (PestID, 2011).

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Philephedra lutea (Cockerell)	MX, US (Nakahara and Gill, 1985)	Nakahara and Gill, 1985	**CONUS, PR: No HI: Yes**	I, F, L, S of other host plants (PestID, 2011)	Yes
Philephedra tuberculosa Nakahara & Gill	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Pulvinaria floccifera Westwood	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Pulvinaria psidii Maskell	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Saissetia coffeae (Walker) (= *S. hemisphaerica* (Targioni))	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Saissetia miranda (Cockerell & Parrott in Cockerell)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Saissetia oleae (Bern.)	MX (Ben-Dov et al., 2010), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Coreidae					
Burtinus notatipennis Stal	MX (Ebeling, 1959), US (Henry and Froeschner, 1988)	Ebeling, 1959	**No**	N/A	N/A
Capaneus humerosus Distant	MX (Ebeling, 1959)	Ebeling, 1959	Yes	L (CABI, 2007)	No
Veneza phyllopus (Linnaeus) (= *Leptoglossus phyllopus* (L))	MX (MacGregor and Gutierrez, 1983), US (CABI, 2011a)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Hemiptera: Diaspididae[14]					
Abgrallaspis aguacatae Evans, Watson & Miller	MX (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**Yes**	F, L, S (Evans et al., 2009)	Yes[14]
Abgrallaspis cyanophylli (Signoret) (= *Hemiberlesia cyanophylli* (Signoret))	MX, US (Watson, undated)	Watson, undated	**No**	N/A	N/A
Abgrallaspis perseae Davidson	MX (Davidson, 1964), CONUS (GA, TX) (Alvarez, 1976)	Davidson, 1964	**[Yes]**	F (Davidson, 1964), L (PestID, 2011)	Yes[14]
Acutaspis agavis (Townsend & Cockerell) (= *Chrysomphalus agavis* (Townsend & Cockerell))	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Acutaspis albopicta (Cockerell)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**CONUS, PR: No HI: Yes**	L (Ben-Dov et al., 2010), F (Alvarez, 1976)	Yes[14]
Acutaspis aliena (Newstead) (= *Melanaspis aliena* (Newstead), *Pseudischnaspis alienus* Houser)	MX, CONUS (FL) (Ben-Dov et al., 2010), US (FL)	Ebeling, 1959	**CONUS, HI: No PR: Yes**	F, L (PestID, 2011)	Yes[14]
Acutaspis perseae (Comstock) (= *Chrysomphalus perseae* Leonardi)	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Acutaspis scutiformis (Cockerell) (= *Chrysomphalus scutiformis* Berlese & Leonardi)	MX (Ebeling, 1959), CONUS (Ben-Dov et al., 2010; Ebeling, 1959)	Ebeling, 1959	**CONUS: No HI, PR: Yes**	L (Ben-Dov et al., 2010)	No

[14] Although armored scales may enter on commercial fruit for consumption, they are highly unlikely to become established via this pathway, and are considered non-actionable on fruits for consumption at U.S. ports-of-entry. Please see discussion in section 2.3 for a detailed explanation.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Aonidiella aurantii (Maskell)	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Aonidiella citrina (Coquillett)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Aonidiella orientalis (Newstead)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Aspidiotus destructor Signoret	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Aspidiotus nerii Bouche	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Chrysomphalus aonidum (L)	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Chrysomphalus bifasciculatus Ferris	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Chrysomphalus dictyospermi (Morgan)	MX (Ben-Dov et al., 2010), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Diaspidiotus ancylus (Putnam) (= *Abgrallaspis howardi* (Cockerell))	MX (Peña et al., 2002), US (Ben-Dov et al., 2010)	Peña et al., 2002	**No**	N/A	N/A
Diaspidiotus perniciosus (Comstock)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Diaspis boisduvalii Signoret	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Diaspis coccois Lichtenstein	MX (Peña et al., 2002), US (Ben-Dov et al., 2010)	Peña et al., 2002	**No**	N/A	N/A

Pest Scientific Name	**Distribution**[1]	**Host association**	**Actionable pest**[2,3]	**Plant part(s) association**[4,5]	**On harvested commodity?**
Diaspis miranda (Cockerell)	MX (Alvarez, 1976)	Alvarez, 1976	**Yes**	F (Alvarez, 1976)	Yes[14]
Diaspis sp. near *miranda*[15]	MX (Alvarez, 1976)	Alvarez, 1976	Yes	F (Alvarez, 1976)	Yes[14]
Fiorinia fioriniae (Targioni-Tozzetti)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Furcaspis biformis (Cockerell)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Hemiberlesia diffinis (Newstead)	MX (Peña et al., 2002), CONUS (FL, GA, LA, MD, MS, NJ, NC, TX) (Ben-Dov et al., 2010)	Peña et al., 2002	**[Yes]**	F, L, S (Watson, undated)	Yes[14]
Hemiberlesia lataniae (Signoret)	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Hemiberlesia sp. near *lataniae*[20]	MX (Alvarez, 1976)	Alvarez, 1976	Yes	F (Alvarez, 1976)	Yes[14]
Hemiberlesia palmae (Cockerell)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Hemiberlesia rapax (Comstock)	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Howardia biclavis (Comstock)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Ischnaspis longirostris (Signoret)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Lepidosaphes beckii (Newman)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A

[15] Exact identity is unknown (Alvarez, 1976).

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Lindingaspis rossi (Maskell) (= *Chrysomphalus rossi* Leonardi)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Lopholeucaspis cockerelli (Grandpré & Charmoy)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Melanaspis deklei Deitz & Davidson	MX, CONUS (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	CONUS: No HI, PR: Yes	S (Ben-Dov et al., 2010)[16]	No
Melanaspis squamea Ferris	MX (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**Yes**	S (Ben-Dov et al., 2010)	No
Morganella longispina (Morgan)	MX, US (Watson, undated)	Watson, undated	**No**	N/A	N/A
Mycetaspis personata (Comstock)	MX (MacGregor and Gutierrez, 1983), US (Ben-Dov et al., 2010)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Oceanaspidiotus spinosus (Comstock) (= *Aspidiotus spinosus* (Comstock))	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Parlatoria proteus (Curtis)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Pinnaspis aspidistrae (Signoret)	MX, US (Watson, undated)	Watson, undated	**No**	N/A	N/A
Pinnaspis strachani (Cooley)	MX (Ben-Dov et al., 2010), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Pseudaonidia trilobitiformis (Green)	MX, US (Watson, undated)	Watson, undated	**No**	N/A	N/A

[16] Based on biology of *Melanaspis squamea.*

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Pseudischnaspis bowreyi (Cockerell)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Pseudoparlatoria ostreata Cockerell	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Pseudoparlatoria parlatorioides (Comstock)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Selenaspidus articulatus (Morgan)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Unaspis citri (Comstock)	MX, US (Ben-Dov et al., 2010)	Ben-Dov et al., 2010	**No**	N/A	N/A
Velataspis dentata (Hoke)	MX (Peña et al., 2002), US (Ben-Dov et al., 2010)	Peña et al., 2002	**No**	N/A	N/A
Hemiptera: Flatidae					
Hansenia pulverulenta (Guerin-Meneville)	MX (MacGregor and Gutierrez, 1983)	MacGregor and Gutierrez, 1983	Yes	L, S (C.M.I., 1987)[17]	No
Hemiptera: Lygaeidae					
Pseudopachybrachius basalis (Dallas)	MX (PestID 2011), US (Chordas III et al., 2005)	PestID, 2011	**No**	N/A	N/A
Hemiptera: Margarodidae					
Icerya purchasi Maskell	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Membracidae					
Aethalion quadratum Fowler	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	Yes	S (Waite and Barrera, 2002)	No

[17] We found no information on the biology or feeding habits of *Hansenia pulverulenta.* Therefore, we assumed that *H. pulverulenta* affects leaves and stems, as is generally the case for members of the Flatidae (C.M.I., 1987)**.**

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Hoplophorion monogramma (Germar) (= *Metcalfiella monogramma* (Germar))	MX (Waite and Barrera, 2002)	Waite and Barrera, 2002	**Yes**	S (Barrera et al., 1998; Waite and Barrera, 2002)	No
Umbonia crassicornis (Amyot & Serville)	MX, US (DPI, 2009)	DPI, 2009	**No**	N/A	N/A
Hemiptera: Monophlebidae					
Crypticerya montserratensis (Riley & Howard) (= *Icerya montserratensis* Riley & Howard)	MX (Ben-Dov et al., 2010), PR (Martorell, 1976)	Ben-Dov et al., 2010	**CONUS, HI: Yes** PR: No	L, S (Posada Ocohoa, 1989)	No
Hemiptera: Pentatomidae					
Brochymena quadripustulata F.	MX (MacGregor and Gutierrez, 1983), US (Henry and Froeschner, 1988)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Nezara viridula (Linnaeus)	MX, US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Pseudococcidae					
Dysmicoccus brevipes (Cockerell) (= *Pseudococcus brevipes*)	MX (Ben Dov undated), US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Ferrisia malvastra (McDaniel)	MX (Ben-Dov et al., 2010; PestID, 2011), US (Ben-Dov et al., 2010; Miller et al., 2005)	Ben-Dov et al., 2010	**No**	N/A	N/A
Ferrisia virgata (Cockerell)	MX (CABI, 2011a), US (Ebeling, 1959)	Ebeling, 1959	No	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Maconellicoccus hirsutus (Green)	MX (CABI, 2011a), CONUS (CA, FL, GA, LA, SC, TX) (CABI, 2011a), HI, PR (Sagarra and Peterkin, 1999)	CABI, 2011a; Sagarra and Peterkin, 1999	[Yes]	F, L, S of various host plants (CABI, 2011a)	Yes
Nipaecoccus jonmartini Williams & Granara de Willink	MX (Ben-Dov et al., 2010; Ben-Dov, 1994)	Ben-Dov et al., 2010	**Yes**	L (PestID, 2011)	No
Nipaecoccus nipae (Maskell) (= *Pseudococcus nipae* Cockerell)	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Paracoccus marginatus Williams & Granara de Willink	MX (CABI, 2011a; Ben-Dov, 1994 ; Williams and Granara de Willink, 1992), CONUS (FL, MT), HI, PR (CABI, 2011a)	CABI, 2011a	**[Yes]**	F, Fl, L, S (CABI, 2011a; PestID, 2011)	Yes
Paraputo olivaceus (Cockerell) (= *Farinococcus olivaceus* (Cockerell))	MX (Ebeling, 1959), US (McKenzie, 1967)	Ebeling, 1959	**No**	N/A	N/A
Phenacoccus gossypii Townsend & Cockerell	MX (Ben-Dov et al., 2010), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Planococcus citri (Risso)	MX (CABI, 2011a), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Planococcus minor (Maskell)	MX, US (Ben-Dov et al., 2010), HI (NAPIS, 2011)	Ben-Dov et al., 2010	**No**	N/A	N/A
Pseudococcus calceolariae (Maskell) (= *P. gahani* Green)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Pseudococcus jackbeardsleyi Gimpel and Miller	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Pseudococcus longispinus (Targioni-Tozzetti) (= *P. adonidum*)	MX, US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Pseudococcus maritimus (Ehrhorn)	MX, US (Ben-Dov et al., 2010)	Ebeling, 1959	**No**	N/A	N/A
Hemiptera: Psyllidae					
Trioza aguacate	MX (Hollis and Martin, 1997)	Hollis and Martin, 1997	Yes	L (Hollis and Martin, 1997)	No
Trioza anceps Tuthill	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	**Yes**	L (Hoddle, 2013)	No
Trioza koebelei Kirkaldy	MX (McKenzie, 1935)	McKenzie, 1935	Yes	L (Popenoe, 1920)	No
Hemiptera: Pyrrhocoridae					
Dysdercus obliquus (Herrich-Schaeffer)	MX (Ebeling, 1959), US (Henry and Froeschner, 1988)	Ebeling, 1959	**No**	N/A	N/A
Largus succinctus (Linnaeus) (= *L. cinctus* Herrich-Schaeffer)	MX (Ebeling, 1959), US (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Hemiptera: Tingidae					
Pseudacysta perseae (Heidemann)	MX (MacGregor and Gutierrez, 1983), US (Ebeling, 1959)	MacGregor and Gutierrez, 1983	**No**	N/A	N/A
Hymenoptera: Formicidae					
Atta cephalotes (Linnaeus)	MX (CABI, 2011a)	CABI, 2011a	**Yes**	L (CABI, 2011a)	No
Atta mexicana (Smith)	MX (Peña et al., 2002), US (CABI, 2011a)	Peña et al., 2002	**No**	N/A	N/A
Atta sexdens (Linnaeus)	MX (CariPestNet, undated)	CariPestNet, undated	**Yes**	L (CABI, 2011a)	No
Solenopsis geminata (Fabricius)	MX, CONUS, HI, PR (CABI, 2011a)	Ebeling, 1959	**No**	N/A	N/A
Lepidoptera: Geometridae					
Sabulodes aegrotata (Guenee)	MX (Waite and Barrera, 2002), US (Whiley et al., 2002)	Waite and Barrera, 2002	US: No HI, PR: Yes	F, L (Waite and Barrera, 2002)	No[18]
Lepidoptera: Gracillariidae					
Caloptilia perseae (Busck) (= *Gracilaria perseae* Busck)	MX (Waite and Barrera, 2002), CONUS (Ebeling, 1959)	Waite and Barrera, 2002	CONUS: No HI, PR: Yes	L (Waite and Barrera, 2002)	No
Lepidoptera: Hesperiidae					
Pyrrhopyge chalybea Scudder	MX (MacGregor and Gutierrez, 1983)	MacGregor and Gutierrez, 1983	**Yes**	L (Diaz Castro, 1977)	No
Lepidoptera: Noctuidae					
Peridroma saucia (Hübner)	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A

[18] *Sabulodes aegrotata* feeds on the surface of the fruit (Peña et al., 2002) and is highly unlikely to remain with the fruit through standard harvesting and processing.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Spodoptera eridania Stoll in Cramer	MX, US (CABI, 2011a)	CABI, 2011a	**No**	N/A	N/A
Lepidoptera: Oecophoridae					
Stenoma catenifer Walsingham	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	**Yes**	F, L (Waite and Barrera, 2002), Sd (CABI, 2011a)	Yes
Lepidoptera: Papilionidae					
Papilio crespontes Cramerg	MX, US (McAuslane, 2009)	Garcia et al., 2001	**No**	N/A	N/A
Papilio garamas abderus Hoppfer (= *P. garamas garamas* Hubner)	MX (Waite and Barrera, 2002), US (Opler and Warren, 2004)	Peña et al., 2002; Waite and Barrera, 2002	**[Yes]**	L (Barrera et al., 1998; Waite and Barrera, 2002)	No
Papilio victorinus morelius Rothschild and Jordan	MX (Waite and Barrera, 2002)	Waite and Barrera, 2002	Yes	L (Waite and Barrera, 2002)	No
Lepidoptera: Pyralidae					
Amyelois transitella (Walker) (= *Paramyelois transitella* Walker)	MX (McGuire and Crandall, 1967), US (CABI, 2007)	Hill, 2008	**No**	N/A	N/A
Accinctapubes albifasciata (Druce) (= *Stericta albifasciata* (Druce))	MX (McKenzie, 1935)	McKenzie, 1935	Yes	L, Br (Solis and Styer, 2003)	No
Lepidoptera: Saturniidae					
Copaxa decrescens Draudt	MX (Garcia et al., 2001)	Garcia et al., 2001	Yes	L (Garcia et al., 2001)	No
Copaxa multifenestrata (Herrich-Schaffer)	MX (Peña et al., 2002)	Peña et al., 2002	**Yes**	L (Barrera et al., 1998)	No
Lepidoptera: Tortricidae					
Amorbia cuneana (Walsingham)	MX (Waite and Barrera, 2002), CONUS (Peña et al., 2002)	Waite and Barrera, 2002	CONUS: No HI, PR: Yes	F, L (Waite and Barrera, 2002)	No[19]

[19] *Amorbia cuneana* and *A. essigana* feed on the surface of the fruit (Peña et al., 2002) and are highly unlikely to

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Amorbia emigratella Busck	MX (MacGregor and Gutierrez, 1983; Waite and Barrera, 2002), US (Zimmerman, 1948)	MacGregor and Gutierrez, 1983; Waite and Barrera, 2002	**No**	N/A	N/A
Amboria essigana Busck	MX (Waite and Barrera, 2002), CONUS (Ebeling, 1959)	Waite and Barrera, 2002	CONUS: No HI, PR: Yes	F, L (Waite and Barrera, 2002)	No[22]
Argyrotaenia montezumae (Walsingham)	MX (Gilligan et al., 2011) CONUS (Ratnasingham, 2007 onwards)	Gilligan et al., 2011	CONUS: No HI, PR: Yes	F, L (Ebeling, 1959)[20]	No[21]
Cryptaspasma perseana Gilligan & Brown	MX (Gilligan et al., 2011)	Gilligan et al., 2011	Yes	F, Sd (Gilligan et al., 2011)	Yes
Platynota stultana Walsingham	MX (CABI, 2011a), US (Ebeling, 1959)	Ebeling, 1959	**No**	N/A	N/A
Thysanoptera: Heterothripidae					
Heterothrips decacornis Crawford	MX (Johansen-Naime et al., 2003), CONUS (FL), PR (Mound and Marullo, 1996)	Johansen-Naime et al., 2003	CONUS, PR: No HI: Yes	Fl, L (Johansen-Naime et al., 2003)	No
Heterothrips mexicanus Watson	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No

remain with the fruit through harvesting and processing.

[20] Based on the biology of *Argyrotaenia citrana* (Fernald) (CABI, 2013).

[21] As a large, external feeder, it is highly unlikely that *A. montezumae* would remain on the harvested commodity.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Thysanoptera: Panchaetothripinae					
Caliothrips fasciatus (Pergande)	MX (Hoddle et al., 2002a), US (Hoddle et al., 2008)	Hoddle et al., 2002a	**No**	N/A	N/A
Caliothrips phaseoli (Hood)	MX (Hoddle et al., 2002a), US (Hoddle et al., 2008)	Hoddle et al., 2002a	**No**	N/A	N/A
Thysanoptera: Phlaeothripidae					
Haplothrips gowdeyi (Franklin)	MX (Hoddle et al., 2002a), US (Zimmerman, 1948)	Hoddle et al., 2002a	**No**	N/A	N/A
Pseudophilothrips perseae (Watson) (=*Liothrips perseae* Watson)	MX (Urias-Lopez et al., 2007; Waite and Barrera, 2002)	Urias-Lopez et al., 2007; Waite and Barrera, 2002	Yes	F (Waite and Barrera, 2002), Fl, L (Urias-Lopez et al., 2007)	Yes
Stephanothrips occidentalis Hood & Williams	MX (Hoddle et al., 2002a), US (Zimmerman, 1948)	Hoddle et al., 2002a	**No**	N/A	N/A
Thysanoptera: Thripidae					
Arorathrips mexicanus (Crawford)	MX (Johansen-Naime et al., 2003), US (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Aurantothrips orchidaceus (Bagnall)	MX (Johansen-Naime et al., 2003), US (Funderburk et al., 2007)	Johansen-Naime et al., 2003	**[Yes]**	Fl, L (Johansen-Naime et al., 2003)	No
Caliothrips fasciatus (Pergande)	MX (Johansen-Naime et al., 2003), US (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Caliothrips phaseoli (Hood)	MX (Johansen-Naime et al., 2003), US (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Caliothrips punctipennis (Hood)	MX (Johansen-Naime et al., 2003), CONUS (Diffie et al., 2008; Mound and Marullo, 1996)	Johansen-Naime et al., 2003	CONUS: No HI, PR: Yes	Fl, L (Johansen-Naime et al., 2003)	No
Exophthalmothrips chiapensis Johansen	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella albacuriosa Johansen	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella aurea Moulton	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella borinquen Hood	MX (Cambero-Campos et al., 2009), PR (Martorell, 1976)	Cambero-Campos et al., 2009	**[Yes]**	Fl (Johansen and Mojica, 2007)	No
Frankliniella sp. nr. *bruneri* Watson	MX (Hoddle et al., 2002a)	Hoddle et al., 2002a	Yes	Fl (Peña et al., 2002)[22]	No
Frankliniella brunnescens Priesner	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No

[22] Unconfirmed reports exist that *Frankliniella bruneri* and *F. chamulae* attack fruit (Peña et al., 2002), but we found no confirmation of this. Therefore, we did not list fruit.

Pest Scientific Name	**Distribution**[1]	**Host association**	**Actionable pest**[2,3]	**Plant part(s) association**[4,5]	**On harvested commodity?**
Frankliniella cephalica Hood	MX (Waite and Barrera, 2002), US (Ebeling, 1959; Hoddle et al., 2008)	Waite and Barrera, 2002	**No**	N/A	N/A
Frankliniella chamulae Johansen	MX (Hoddle et al., 2002a)	Hoddle et al., 2002a	Yes	Fl (Peña et al., 2002)[27]	No
Frankliniella cubensis Hood	MX (Hoddle et al., 2002a), PR (Martorell, 1976)	Hoddle et al., 2002a	**[Yes]**	Fl (Peña et al., 2002)	No
Frankliniella curiosa Priesner	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella difficilis Hood	MX (Cambero-Campos et al., 2009), PR (Martorell, 1976)	Cambero-Campos et al., 2009	[Yes]	Fl (Johansen and Mojica, 2007)	No
Frankliniella dubia Priesner	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella fallaciosa Priesner	MX (Hoddle et al., 2002a)	Hoddle et al., 2002a	**Yes**	Fl, L, S (Hoddle et al., 2002a)[23]	No
Frankliniella gossypiana Hood	MX (Hoddle et al., 2002a), US (Hoddle et al., 2008)	Hoddle et al., 2002a	**No**	N/A	N/A
Frankliniella insularis (Franklin)	MX (Hoddle et al., 2002a), US (Hoddle et al., 2008)	Hoddle et al., 2002a	**No**	N/A	N/A
Frankliniella inutilis Priesner	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	**Yes**	Fl, L (Johansen-Naime et al., 2003)	No

[23] *Frankliniella fallaciosa* was collected by beating avocado branches with young foliage and flowers present (Hoddle et al., 2002a); no specific plant part of association was mentioned.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Frankliniella invasor Sakimura	MX (Cambero-Campos et al., 2009)	Cambero-Campos et al., 2009	**Yes**	Fl (Johansen and Mojica, 2007)	No
Frankliniella kelliae Sakimura	MX (Johansen-Naime et al., 2003), US (Diffie et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Frankliniella minor Moulton	MX (Instituto de Biología, undated)	Cambero-Campos et al., 2009	Yes	Fl (Johansen and Mojica, 2007)	No
Frankliniella minuta (Moulton)	MX (Johansen-Naime et al., 2003), US (Mound and Marullo, 1996)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Frankliniella occidentalis (Pergande)	MX (Hoddle et al., 2002a), US (CABI, 2011a)	Hoddle et al., 2002a	**No**	N/A	N/A
Frankliniella panamensis Hood	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Frankliniella pestinae Sakimura & O'Neill	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	**Yes**	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella rostrata Priesner	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella salviae Moulton	MX (Johansen-Naime et al., 2003), CONUS (Mound et al., 2005)	Johansen-Naime et al., 2003	CONUS: No HI, PR: Yes	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella seneciopallida Johansen	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No

Pest Scientific Name	**Distribution**[1]	**Host association**	**Actionable pest**[2,3]	**Plant part(s) association**[4,5]	**On harvested commodity?**
Frankliniella simplex Priesner	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	**Yes**	Fl, L (Johansen-Naime et al., 2003)	No
Frankliniella williamsi Hood (= *F. spinosa* Moulton)	MX (Johansen-Naime et al., 2003), US (Diffie et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Frankliniella zucchini Nakahara & Monteiro	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Heliothrips haemorrhoidalis (Bouche)	MX (Waite and Barrera, 2002), US (Whiley et al., 2002)	Waite and Barrera, 2002	**No**	N/A	N/A
Leucothrips furcatus Hood	MX (Hoddle et al., 2002a), CONUS (Hoddle et al., 2008)	Hoddle et al., 2002a	CONUS: No HI, PR: Yes	L (Hoddle et al., 2008)	No
Leucothrips piercei (Morgan)	MX (Johansen-Naime et al., 2003), US (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Microcephalothrips abdominalis (Crawford)	MX (Johansen-Naime et al., 2003), US (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Neohydatothrips annulipes (Hood)	MX (Johansen-Naime et al., 2003), CONUS (Diffie et al., 2008; Mound et al., 2005)	Johansen-Naime et al., 2003	CONUS: No HI, PR: Yes	Fl, L (Johansen-Naime et al., 2003)	No

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Neohydatothrips burungae (Hood)	MX (Hoddle et al., 2002a), US (Hoddle et al., 2008)	Hoddle et al., 2002a	**No**	N/A	N/A
Neohydatothrips inversus (Hood)	MX (Johansen-Naime et al., 2003), CONUS (Diffie et al., 2008)	Johansen-Naime et al., 2003	CONUS: No HI, PR: Yes	Fl, L (Johansen-Naime et al., 2003)	No
Neohydatothrips signifer Priesner	MX (Hoddle, 1999)	Hoddle, 1999	Yes	L (Mound and Marullo, 1996)	No
Neohydatothrips tibialis Priesner	MX (Hoddle et al., 2002a)	Hoddle et al., 2002a	Yes	L (Mound and Marullo, 1996)	No
Neohydatothrips variabilis (Beach)	MX (Johansen-Naime et al., 2003), CONUS (AZ, CA, GA, IL, NE, NJ, OK, TN, UT) (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**[Yes]**	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips albosilvicola Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips aceri (Moulton)	MX (Waite and Barrera, 2002), US (Hoddle et al., 2008)	Hoddle et al., 2002a; Waite and Barrera, 2002	CONUS: No HI, PR: Yes	F (Waite and Barrera, 2002), L (Hoddle et al., 2008)	Yes
Scirtothrips aztecus Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips citri (Moulton)	MX (Hoddle et al., 2002a), US (Hoddle et al., 2008), HI (Zimmerman, 1948)	Hoddle et al., 2002a	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Scirtothrips cognatoalbus Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips danieltelizi Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips detereomangus Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips hectorgonzalezi Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips longipennis (Bagnall)	MX (Johansen and Mojica-Guzman, 1998), HI (C.M.I., 1985) CONUS, PR (Mound and Palmer, 1981)	Johansen and Mojica-Guzman, 1998	No	N/A	N/A
Scirtothrips mangiferaffinis Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips martingonzalezi Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips perseae Nakahara (= *S. uruapaniensis*; *S. kupandae*; *S. manihotifloris*; *S. tacambarensis*; *S. aguacatae*)[24]	MX (Waite and Barrera, 2002), CONUS, HI (CABI, 2011a)	Waite and Barrera, 2002	CONUS, HI: No PR: Yes	F (Waite and Barrera, 2002)	Yes
Scirtothrips silvatropicalis Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No

[24] Taxonomy is based on Stevenson, 1975).

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Scirtothrips silvicola Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips totonacus Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips willihennigi Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scirtothrips zacualtipanensis Johansen & Mojica	MX (Johansen-Naime et al., 2003)	Johansen-Naime et al., 2003	Yes	Fl, L (Johansen-Naime et al., 2003)	No
Scolothrips sexmaculatus (Pergande)	MX (Johansen-Naime et al., 2003), US (Hoddle et al., 2008)	Johansen-Naime et al., 2003	**No**	N/A	N/A
Selenothrips rubrocinctus (Giard)	MX (MacGregor and Gutierrez, 1983), US (Whiley et al., 2002)	Whiley et al., 2002	**No**	N/A	N/A
Thrips palmi Karny	MX, CONUS (CA, FL, TX), HI, PR (CABI, 2011a)	CABI, 2011a	**[Yes]**	F, L, S (CABI, 2011a)	Yes
Thrips tabaci Lindeman	MX (Peña et al., 2002), US (CABI, 2007)	Peña et al., 2002	**No**	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
FUNGI and CHROMISTANS					
Albonectria rigidiuscula (Berk. & Broome) Rossman & Samuels (= *Calonectria rigidiuscula* (Berk. & Broome) Sacc; *Nectria rigidiuscula* Berk. & Broome) Anamorph: *Fusarium decemcellulare* C. Brick	MX (CABI, 2011a; Farr et al., 2013) CONUS (OK, FL) (Farr et al., 2013; Ploetz, 1996), PR (Stevenson, 1975)	Ohr et al., 2003; Pegg et al., 2002	No[25]	F (Ohr et al., 2003; Pegg et al., 2002)	Yes
Armillaria mellea (Vah1:Fr.) P. Kumm.	MX (Alvarez, 1976; CABI, 2011a), CONUS (CABI/EPPO, 1997; Farr et al., 2013), HI (Farr et al., 2013)	Alvarez, 1976; Pegg et al., 2002; Teliz, 2000	PR: Yes CONUS, HI: No	R, S (lower) (CABI, 2011a)	No
Athelia rolfsii (Curzi) Tu & Kimbr. (= ***Sclerotium rolfsii*** Sacc.) Anamorph: *Corticium rolfsii* Curzi	MX, CONUS, HI, PR (C.M.I., 1969)	Alfieri Jr. et al., 1984	No	N/A	N/A
Botryosphaeria ribis Grossenb. & Duggar	MX, CONUS, HI (Farr et al., 2013)	Menge and Ploetz, 2003	PR: Yes CONUS, HI: No	S (Alvarez, 1976; Rodriguez, 1972; Teliz, 2000);	No
***Dialonectria episphaeria* (Tode : Fr.) Cooke** (= ***Fusarium episphaeria* (Tode : Fr.) W.C. Snyder & H.N. Hansen)**	MX (Vidales-Fernández, 2009), US (Farr et al., 2013)	Vidales-Fernández, 2009	No	N/A	N/A

[25] In 2012, *A. ridiguscula* was de-regulated in the United States (PestID, 2012).

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Fusarium oxysporum Schltdl. : Fr.	MX (Fernando Ceja Torres et al., 2000), CONUS, PR (UGA, 2011), HI (HEAR, 2005)	Fernando Ceja Torres et al., 2000	No	N/A	N/A
Fusarium roseum Link : Fr.	MX (Vidales-Fernández, 2009), US (Farr, 2011)	Vidales-Fernández, 2009	No	N/A	N/A
Ganoderma lucidum (Curtis : Fr) P. Karst.	MX (Morales-Garcia, 1989), CONUS, HI (Farr et al., 2013, UGA, 2010b), PR (Farr et al., 2013)	Bigelow et al., 1998	No	N/A	N/A
Gibberella intricans Wollenw. Anamorph: ***Fusarium equiseti* (Corda) Sacc.**	MX (Fernando Ceja Torres et al., 2000), CONUS (Farr et al., 2013), PR (UGA, 2011), HI (USDA-FS, 2004)	Fernando Ceja Torres et al., 2000	No	N/A	N/A
Glomerella acutata Guerber & J.C. Correll Anamorph: *Colletotrichum acutatum* J. H. Simmonds	MX (Avila-Quezada et al., 2007), US (Farr et al., 2013)	Avila-Quezada et al., 2007	No	N/A	N/A
Glomerella cingulata (Stone.) Spauld. & H. Schren Anamorph: ***Colletotrichum gloeosporioides* Penz. & Sacc. (Penz.)**	MX (Fucikovsky and Luna, 1987; Ploetz et al., 1994; PestID, 2011), CONUS, HI, PR (UGA, 2010b)	PestID, 2011; Ploetz et al., 1994	No	N/A	N/A

Pest Scientific Name	**Distribution**[1]	**Host association**	**Actionable pest**[2,3]	**Plant part(s) association**[4,5]	**On harvested commodity?**
Haematonectria haematococca (Berk. & Broome) Samuels & Rossman Anamorph: ***Fusarium solani* (Mart.) Sacc.**	MX (Fernando Ceja Torres et al., 2000), US (Farr et al., 2013; UGA, 2011)	Fernando Ceja Torres et al., 2000	No	N/A	N/A
Lasiodiplodia theobromae (Pat.) Griffon & Maubl. (= *Botryodiplodia theobromae* Pat., *Diplodia natalensis* Pole-Evans)	MX, CONUS (Diffie et al., 2008), HI (Diffie et al., 2008; HEAR, 2005), PR (Diffie et al., 2008; Stevenson, 1975)	Ohr et al., 2003	No	N/A	N/A
Mycosphaerella perseae L.E. Miles	MX (Farr et al., 2013; Teliz, 2000), CONUS (FL) (Farr et al., 2013), PR (Stevenson, 1975)	Farr et al., 2013; Stevenson, 1975	HI: Yes CONUS, PR: No	L (Stevenson, 1975; Teliz, 2000)	No
Neonectria ditissima (Tul. & C. Tul.) Samuels & Rossman (= ***Nectria galligena* Bres**)	MX (Vidales-Fernández, 2009), US (Farr et al., 2013)	Vidales-Fernández, 2009	No	T (Vidales-Fernández, 2009)	No
Pestalotiopsis adusta (Ellis & Everh.) Steyaert	MX (PestID, 2011), US (Farr et al., 2013)	PestID, 2011; Teliz, 2000	No	N/A	N/A
Pestalotiopsis versicolor (Speg.) Steyaert **(= *Pestalotia versicolor* Speg.)**	MX (Teliz, 2000), CONUS (FL) (Alfieri Jr. et al., 1984), PR (Stevenson, 1975)	Teliz, 2000	No	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Phyllachora gratissima Rehm.	MX (PestID, 2011; Teliz, 2000), PR (Stevenson, 1975)	PestID, 2011; Teliz, 2000	[Yes]	L (Farr et al., 2013, Teliz, 2000)	No
Phyllosticta micropuncta Cooke (= *P. perseae* Ellis & G. Martin)	MX (Teliz, 2000), CONUS (Farr et al., 2013)	Teliz, 2000	HI, PR: Yes CONUS: No	L (Farr et al., 2013; Teliz, 2000)	No
Phymatotrichopsis omnivora (Duggar) Hennebert (= *Phymatotrichum omnivorum* (Shear) Duggar)	MX (Morales-Garcia, 1989), CONUS (CABI, 2011a; UGA, 2010b)	Morales-Garcia, 1989; Teliz, 2000	No	R (Teliz, 2000)	No
Phytophthora cinnamomi Rands	MX (Morales-Garcia, 1989), CONUS, HI, PR (UGA, 2010b)	Ploetz et al., 1994	No	N/A	N/A
Phytophthora citricola Sawada[26]	MX (Fucikovsky and Luna, 1987; Oudemans, 1994), CONUS, HI (Erwin and Ribeiro, 1996)	Erwin and Ribeiro, 1996; Ploetz et al., 1994	PR: Yes CONUS, HI: No	F, S (Erwin and Ribeiro, 1996; Faber et al., 1997; Fucikovsky and Luna, 1987)	Yes
Phytophthora nicotianae Breda de Haan (= *P. parasitica* Dastur)	MX, CONUS, HI, PR (Farr et al., 2013)	Erwin and Ribeiro, 1996	No	N/A	N/A

[26] *Phytophthora citricola* is present in hosts other avocado in the United States and Hawaii (Farr et al., 2013). *Phytophthora citricola* has long been considered a complex of subgroups and Hong et al. (2009) found that the avocado subgroup of *Phytophthora* constituted a distinct species from *P. citricola*. They reassigned that subgroup to a new species *Phytophthora mengei* Browne, Gallegly, Hong. In that work, however, only avocado isolates from CA were used, and it is unclear if *P. citricola* isolates from MX would test the same. Therefore, we treated them here as *P. citricola*.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Phytophthora heveae A. Thomps.[27]	MX (Abad, 2011; Ochoa-Ascencio et al., 2011), CONUS (Erwin and Ribeiro, 1996)	Abad, 2011; Erwin and Ribeiro, 1996; Fernando Ceja Torres et al., 2000; Ochoa-Ascencio et al., 2011	PR, HI: Yes CONUS: No	F (Erwin and Ribeiro, 1996; Fernando Ceja Torres et al., 2000), S (Fernando Ceja Torres et al., 2000)	Yes
Phytophthora palmivora (E.J. Butler) E. J. Butler	MX, CONUS, HI, PR (Farr et al., 2013)	Erwin and Ribeiro, 1996	No	N/A	N/A
Pseudocercospora purpurea (Cooke) Deighton (= *Cercospora purpurea* Cooke)	MX (Fucikovsky and Luna, 1987), CONUS (Ploetz et al., 1994), HI (Gonsalves and Ferreira, 1994a), PR (CABI, 2011a)	Fucikovsky and Luna, 1987; Ploetz et al., 1994	No	N/A	N/A
Pythium ultimum Trow	MX (C.M.I., 1981), CONUS, HI, PR (C.M.I., 1981)	French, 1989	No	N/A	N/A
***Rhizopus stolonifer* (Ehrenb. : Fr.) Vuill.** Syn.: *R. nigricans* Ehrenb.	MX, CONUS, HI, PR (Farr et al., 2013)	Ohr et al., 2003	No	N/A	N/A

[27] The *Phytophthora* species that occur on avocado in Mexico is an ongoing study. *Phytophthora boehmeriae* has been reported on avocado in Mexico (Coria Avalos, 1985; Romero Cova and Solis Aragon, 1996; Teliz, 2000), but these reports were thought to be mis-identifications (Abad, 2009; Coffey, 2009), and recently the species found on avocado in Mexico was confirmed to be *Phytophthora heveae* (Abad, 2011; Ochoa-Ascencio et al., 2011). Some references place *P. heveae* as a synonym of *P. palmivora* (CABI, 2011a, 2011b); however, molecular work puts them in different clades (Kang, 2011). They also have morphological differences (Erwin and Ribeiro, 1996). *Phytophthora heveae* is reported from the continental United States (Farr et al., 2013, Erwin and Ribeiro, 1996). Records of *P. heveae* in Hawaii and Puerto Rico were not found; however, confusion with closely related species may be affecting distribution records.

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Rosellinia bunodes (Berk. & Br.) Sacc. Black	MX (C.M.I., 1985), PR (C.M.I., 1985; Stevenson, 1975)	Ploetz et al., 1994; Teliz, 2000	CONUS, HI: Yes PR: No	R (Ploetz et al., 1994)	No
Rosellinia necatrix Prill. Anamorph: *Dematophora necatrix* R. Hartig	MX (C.M.I., 1987), CONUS (C.M.I., 1987; Ploetz et al., 1994)	Ploetz et al., 1994; Teliz, 2000	HI, PR: Yes CONUS: No	R (Ploetz et al., 1994)	No
Rosellinia pepo Pat.	MX (C.M.I., 1968), PR (Stevenson, 1975)	Ploetz et al., 1994	CONUS, HI: Yes PR: No	R (Ploetz et al., 1994)	No
Sphaceloma perseae Jenkins	MX (Fucikovsky and Luna, 1987; PestID, 2011), CONUS (C.M.I., 1986a), PR (C.M.I., 1986a; Stevenson, 1975)	PestID, 2011; Teliz, 2000	HI: Yes CONUS, PR: No	F (Pegg et al., 2002; PestID, 2011), L (Pegg et al., 2002)	Yes
***Thanatephorus cucumeris* (A.B. Frank) Donk** Anamorph: *Rhizoctonia solani* Kühn	MX (Alvarez, 1976), CONUS, HI, PR (Farr et al., 2013; UGA, 2010b)	Alvarez, 1976; Farr et al., 2013	No	N/A	N/A
Verticillium albo-atrum Reinke & Bert.	MX (Morales-Garcia, 1989), CONUS, HI (UGA, 2010b); PR (C.M.I., 1986b)	Morales-Garcia, 1989; Teliz, 2000	No	N/A	N/A
BACTERIA AND PHYTOPLASMAS					
Agrobacteriurn tumefaciens (Smith & Town.) Conn	MX (Alvarez, 1976), CONUS, PR, HI (UGA, 2010a)	Teliz, 2000	No	N/A	N/A

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
Erwinia carotovora subsp. *carotovora* (Jones) Bergey et al. (= *Pectobacterium carotovorum* subsp. *carotovorum* (Jones) Hauben et al. emend. Gardan et al.)	MX (CABI, 2011a), HI (CABI, 2011a; HEAR, 2005), CONUS, PR (CABI, 2011a; UGA, 2010a)	Bradbury, 1986	No	N/A	N/A
Erwinia herbicola (Lijhnis) Dye (= *Pantoea agglomerans* (Ewing and Fife) Gavini)	MX (Fucikovsky and Luna, 1987), CONUS (CABI, 2011a), PR (University of Puerto Rico, 2001), HI (HEAR, 2005)	Fucikovsky and Luna, 1987	No	N/A	N/A
Pseudomonas syringae pv. *syringae* van Hall	MX (Fucikovsky and Luna, 1987), CONUS, PR (C.M.I., 1988), HI (HEAR, 2005)	Bradbury, 1986	No	N/A	N/A
NEMATODES					
Radopholus similis (Cobb) Thorne	MX (CABI, 2011a), CONUS (CA, FL, TX) (NGDC, 1984), HI, PR (Williams and Granara de Willink, 1992)	Williams and Granara de Willink, 1992	[Yes]	R (Williams and Granara de Willink, 1992)	No
VIRUSES and VIROIDS					
Avocado sunblotch viroid	MX (Fucikovsky and Luna, 1987), CONUS (CA, FL) (Ploetz et al., 1994)	Ploetz et al., 1994	HI, PR: Yes CONUS: No	All plant parts including seed (Ploetz et al., 1994; Dodds et al., 2006)	Yes

Pest Scientific Name	Distribution[1]	Host association	Actionable pest[2,3]	Plant part(s) association[4,5]	On harvested commodity?
ALGAE					
Cephaleuros virescens Ktz.	MX (PestID, 2011), CONUS (Holcomb et al., 1997; Nelson, 2008); PR (Morton, 1987a), HI (Nelson, 2008)	PestID, 2011; Nelson, 2008	No	N/A	N/A

2.3. Notes on pests identified in the pest list

Armored scales: We did not further analyze the armored scales (Hemiptera: Diaspididae) identified in this risk assessment as quarantine pests likely to follow the pathway (*Abgrallaspis aguacatae*, *A. perseae*, *Acutaspis albopicta*, *A. scutiformis*, *A. aliena*, *Diaspis miranda*, *Diaspis* sp. near *miranda*, *Hemiberlesia diffinis*, *Hemiberlesia* sp. near *latania*, *Melanaspis deklei*, and *M. squamea*), because armored scales are highly unlikely to establish via this pathway due to their very limited ability to disperse to new host plants (Miller et al., 1985; PERAL, 2007). Only a certain immature form of armored scales, the crawler stage, can self-disperse. Crawlers are highly unlikely to successfully disperse by walking from their natal host since they are not capable of rapid movement over bare soil or rough surfaces. They are typically dispersed from plant to plant by wind. Additionally, their dispersal period is limited to approximately 24 hours, after which they start feeding, become firmly anchored to the host tissue, and lose their legs. Adult females have no wings or legs. Dispersal from fruit discarded into the environment is highly unlikely because of low wind speeds at ground level and low survival rate of crawlers on the ground or on decaying fruit or fruit peels.

2.4. Pests selected for further analysis

We identified 18 pests for further analysis (Table 2). All of these organisms are actionable pests for the continental United States, Hawaii, and/or Puerto Rico and have a reasonable likelihood of being associated with the commodity plant part(s) at the time of harvest and remaining with the commodity, in viable form, throughout the harvesting process.

Table 2. Pests selected for further analysis.

Type	Pest Classification	Pest Scientific Name	Actionable pest for:		
			CONUS	HI	PR
Arthropods	**Coleoptera: Curculionidae**	*Conotrachelus aguacatae*	✓	✓	✓
		Conotrachelus perseae	✓	✓	✓
		Conotrachelus serpentinus		✓	✓
		Copturus aguacatae	✓	✓	✓
		Heilipus lauri	✓	✓	✓
	Hemiptera: Coccidae	*Philephedra lutea*		✓	
	Hemiptera: Pseudococcidae	*Maconellicoccus hirsutus*	✓	✓	✓
		Paracoccus marginatus	✓	✓	✓
	Lepidoptera: Oecophoridae	*Stenoma catenifer*	✓	✓	✓
	Lepidoptera: Tortricidae	*Cryptaspasma perseana*	✓	✓	✓
	Thysanoptera: Phlaeothripidae	*Pseudophilothrips perseae*	✓	✓	✓
	Thysanoptera: Thripidae	*Scirtothrips aceri*		✓	✓
		Scirtothrips perseae			✓
		Thrips palmi	✓	✓	✓
Fungi and Chromistans		*Phytophthora citricola*			✓
		Phytophthora heveae		✓	✓
		Sphaceloma perseae		✓	
Viroids		Avocado sunblotch viroid		✓	✓

3. Assessing Pest Risk Potential

3.1. Introduction

For each pest selected for further analysis, we estimate its overall pest risk potential. Risk is described by the likelihood of an adverse event, the magnitude of the consequences, and uncertainty. In this risk assessment, we first determine for each pest if there is an endangered area within the import area. The endangered area is defined as the portion of the import area where ecological factors favor the establishment of the pest and where the presence of the pest will result in economically important losses. Then we determine the overall risk of each pest using two separate components: 1) the likelihood of its introduction into the endangered area on the imported commodity (i.e., the likelihood of an adverse event), and 2) the consequences of its introduction (i.e., the magnitude of the consequences). In general, we assess both of these components for each pest. However, if we determine that the risk of either of these components is negligible, it is not necessary to assess the other, as the overall pest risk potential would be negligible regardless of the result of the second component.

The likelihood and consequences of introduction are assessed using different approaches. For the consequences of introduction, we determine if the pest meets the threshold (Yes/No) of likely causing unacceptable consequences of introduction. This determination is based on estimating

the potential consequences of introduction in terms of physical losses (rather than monetary losses). The threshold is based on a proportion of damage rather than an absolute value or amount. Pests that are like to impact at least 10 percent of the production of one or more hosts are deemed "threshold pests."

For likelihood of introduction, which is based on the likelihoods of entry and establishment, we qualitatively assess risk using the ratings Negligible, Low, Medium, and High. The risk factors comprising the model for likelihood of introduction are interdependent and, therefore, the model is multiplicative rather than additive. Thus, if any one risk factor is rated as Negligible, then the overall likelihood will be Negligible. For the overall likelihood of introduction risk rating, we define the different categories as follows:

High: Pest introduction is highly likely to occur.

Medium: Pest introduction is possible, but for that to happen, the exact combination of required events needs to occur.

Low: Pest introduction is unlikely to occur because one or more of the required events are unlikely to happen, or the full combination of required events is unlikely to align properly in time and space.

Negligible: Pest introduction is highly unlikely to occur given the exact combination of events required for successful introduction.

3.2. Assessment results

3.2.1. Avocado sunblotch viroid

We determined the overall likelihood of introduction to be Low. We present the results of this assessment in the table below. We determined that the establishment of avocado sunblotch viroid in Hawaii and Puerto Rico is likely to cause unacceptable impacts. We present the results of this assessment in the table below.

Determination of the portion of Hawaii and Puerto Rico endangered by avocado sunblotch viroid

Climatic suitability	Avocado sunblotch viroid is present in Australia, South America (Peru, Venezuela), Africa (South Africa), Asia (Israel), Europe (Spain), Mexico, and the continental United States (Florida and California) (Dale J.L et al., 1982; Dodds et al., 2006; Lopez-Herrera, 1987; Torre-A, 2009). A comparison of these regions with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment may occur throughout Hawaii and Puerto Rico.
Potential hosts at risk in PRA Area	Avocado is the only known natural host for avocado sunblotch viroid (Dale J.L et al., 1982). Avocados are grown in Hawaii and Puerto Rico (NRCS, 2013).
Economically important hosts at risk[a]	Avocados are an economically important crop grown in Hawaii and Puerto Rico (Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at	Avocado sunblotch viroid is a minor problem where tree certification programs exist (Menge and Ploetz, 2003). If propagation material is not persistently kept clean, however, it can become a severe and widespread

risk	problem (Menge and Ploetz, 2003). The viroid typically causes the following: abnormal tree growth; red, yellow, pink or white streaks on young branches; leaves may become bleached in appearance and fruit may develop white, yellow, or red blotches/depressions (Dodds et al., 2006; Menge and Ploetz, 2003). Some trees may become symptomless after expressing symptoms, and some infected trees remain symptomless carriers, complicating surveillance/management (Dodds et al., 2006). Both symptomless and symptomatic trees will have "greatly" reduced yields (Menge and Ploetz, 2003) or may have a heavy fruit set of small fruit (Dodds et al., 2006).
Defined Endangered Area	The endangered area encompasses avocado production throughout Hawaii and Puerto Rico.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of avocado sunblotch viroid into the Hawaii and Puerto Rico via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	MU	Avocado sunblotch viroid is systemic in the host tree and infected trees are often stunted and exhibit a sprawling growth. All infected trees, symptomless or not, usually have greatly reduced yield (Dodds et al., 2006). Fucikovsky and Luna (Fucikovsky and Luna, 1987) reported that avocado sunblotch viroid was understudied in Mexico due to its extremely low incidence. We found no additional reports. Hence, we rated the pest prevalence as Low.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Low	MC	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse to detect various pests that may be contaminating the fruit (7 CFR § 319.56-30, 2011). Symptomatic avocado fruit are highly likely to be culled, but symptomless fruit would go undetected. Consequently, we did not change the previous rating (A1).
Risk Element A3: Likelihood of surviving transport and	Low	C	No transport or storage conditions have been provided that may reduce the

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
storage conditions of the consignment			prevalence of avocado sunblotch viroid on the fruit (see Section 1.4: Description of pathway). Typical shipping conditions for avocado seem unlikely to affect the viroid.
Risk Element A: Overall risk rating for likelihood of entry	Low	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	Low	MC	Avocado is the only known natural host for this viroid and it has no known vectors (Dale J.L et al., 1982; Dodds et al., 2006). The primary means of dispersal is graft transmission or natural root grafts in the field (Menge and Ploetz, 2003). The viroid is seed transmitted at high rates (estimated 80-100 percent) with symptomless trees and only occasionally with trees expressing symptoms (Menge and Ploetz, 2003). To infect other avocado trees, seeds from discarded fruit (with seeds) would need to germinate and survive, *and* be in close proximity to other avocado plants. Pollen transmission is reported but only affects fruit; no other parts of the tree (Menge and Ploetz, 2003). Given the limited host range and the limited ability for natural dispersal, the likelihood of coming into contact with host material is Low.
Risk Element B2: Likelihood of arriving in the endangered area	Low	MC	Less than 10 percent of the population (including the continental United States) lives in the endangered area.
Risk Element B: Combined likelihood of establishment	Low	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Low	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

Assessment of the consequences of introduction of Avocado sunblotch viroid into Hawaii and Puerto Rico (i.e., the PRA area)

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Direct Impacts			
Risk Element C1: Damage potential in the endangered area	Yes	MC	Avocado sunblotch viroid is a minor problem where tree certification programs exist. However, if persistent efforts are not utilized to keep propagation material clean, it can become a severe and widespread problem (Menge and Ploetz, 2003). Damages as listed under pest potential on economically important hosts above indicate that if Avocado sunblotch viroid were introduced into Hawaii or Puerto Rico it would be an additional pathogen to screen for in propagation/certification schemes. Due to the complications of symptomless carriers and yield reductions it is likely this viroid would have a significant damage potential.
Risk Element C2: Spread potential	Yes	MU	Avocado sunblotch can be spread through mechanical transmission (up to 30%), root grafting, pollen transmission, and seed transmission (especially with symptomless carriers) (Dodds et al., 2006). Symptomless carriers may also contribute to spread potential (Dodds et al., 2006). Spatial analysis of the USDA avocado germplasm collection found the effective range of spread for avocado sunblotch viroid increased more than threefold during a 13 year span and despite strict sanitation procedures, incidence of the viroid increased (Schnell, 2011). The wide geographic distribution of avocado sunblotch viroid (see Climatic suitability above) suggests it would not be limited should it become introduced into Hawaii or Puerto Rico.

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element C: Pest introduction is likely to cause unacceptable direct impacts	Yes	N/A	
Trade Impacts			
Risk Element D1: Export markets at risk	N/A	N/A	
Risk Element D2: Likelihood of trading partners imposing additional phytosanitary requirements	N/A	N/A	
Risk Element D: Pest is likely to cause significant trade impacts	N/A	N/A	
Conclusion			
Is the pest likely to cause unacceptable consequences in the PRA area?	Yes	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.2. *Conotrachelus aguacatae*

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Conotrachelus aguacatae*

Climatic suitability	*Conotrachelus aguacatae* is only known to occur in Mexico, specifically central Mexico (O'Brien and Wibmer, 1982; Whitehead, 1979). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Plant Hardiness Zones 9-11. Additionally, the climate throughout Hawaii and Puerto Rico appear suitable for establishment of *C. aguacatae*.
Potential hosts at risk in PRA Area	The only known host of *C. aguacatae* is avocado (*Persea americana*) (CABI, 2013). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013), but may also be found in Texas (Crane et al., 2010). Avocados are also commercially grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within the regions determined to be suitable for establishment of *C. aguacatae*.

Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	Up to 85 percent fruit loss has been documented (Peña, 1998).
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2013; #3).

Assessment of the likelihood of introduction of *Conotrachelus aguacatae* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	C	The systems approach outlined in section 1.4 includes specific measures for surveys and inspections to detect any presence of this pest in the field (7 CFR § 319.56-30, 2011). Orchards in which *C. aguacatae* is detected would not be eligible for export certification. *Conotrachelus aguacatae* would therefore always have a low association with these harvested 'Hass' avocados for export.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	C	Guidelines call for strict inspection, cutting, and culling of avocado fruit in the packinghouse (7 CFR § 319.56-30, 2011), which appear to be effective. Any *C. aguacatae* infesting harvested fruit are highly likely to be detected and removed from the pathway in the packinghouse. Consequently, we decreased the previous rating (A1) from Low to Negligible, and the analysis of this pest stops here.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.3. *Conotrachelus perseae*

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Conotrachelus perseae*

Climatic suitability	*Conotrachelus perseae* is currently established in Mexico, Costa Rica, Guatemala, Honduras, and Nicaragua (O'Brien and Wibmer, 1982; Whitehead, 1979). A comparison of these regions with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Plant Hardiness Zones 9-11. Additionally, the climate throughout Hawaii and Puerto Rico appears suitable for establishment of *C. perseae*.
Potential hosts at risk in PRA Area	*Conotrachelus perseae* is an important pest of avocado (Waite and Barrera, 2002; Whitehead, 1979). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013), but may also be found in Texas (Crane et al., 2010). Avocados are also commercially grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within the regions determined to be suitable for establishment of *C. perseae*.

Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	Infestations of *C. perseae* may result in losses of up to 80 percent in avocado (Waite and Barrera, 2002).
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Conotrachelus perseae* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	C	The systems approach outlined in section 1.4 includes specific measures for surveys and inspections to detect any presence of this pest in the field (7 CFR § 319.56-30, 2011). Orchards in which *C. perseae* is detected would not be eligible for export certification. *Conotrachelus perseae* would therefore always have a low association with harvested 'Hass' avocados for export into the United States.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	C	Guidelines call for strict inspection, cutting, and culling of avocado fruit in the packinghouse (7 CFR § 319.56-30, 2011), and which appear to be effective. Any *C. perseae* infesting harvested fruit are highly likely to be detected and removed from the pathway in the packinghouse. Consequently, we decreased the previous rating (A1) from Low to Negligible, and the analysis of this pest stops here.

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.4. *Conotrachelus serpentinus*

Based on the current systems approach used in Mexico for other *Conotrachelus* species of concern, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of Hawaii and Puerto Rico endangered by *Conotrachelus serpentinus*

Climatic suitability	*Conotrachelus serpentinus* is present in Mexico, Florida, the Bahamas, Cuba, and Haiti (Whitehead, 1979). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment is possible throughout Hawaii and Puerto Rico for establishment of *C. serpentinus*.
Potential hosts at risk in PRA Area	*Conotrachelus serpentinus* may attack avocados (*Persea americana*) as well as other *Persea* spp. (Whitehead, 1979).
Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically	*Conotrachelus serpentinus* may damage avocado fruit, but the extent of the damage that may be attributed to this species is unclear (Whitehead,

important hosts at risk	1979). As indicated by Whitehead (1979), *C. serpentinus* is a potential pest of commercially produced avocado.
Defined Endangered Area	The endangered area includes avocados and *Persea* spp. grown throughout Hawaii and Puerto Rico.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Conotrachelus serpentinus* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	C	The life cycle and association with avocado fruit of *C. serpentinus* appears to be the same as that of *C. aguacatae* and *C. perseae* (Whitehead, 1979). The systems approached outlined in section 1.4 includes specific measures for surveys and inspections to reduce prevalence of *C. aguacatae* and *C. perseae* in the field (7 CFR § 319.56-30, 2011). Those surveys should also detect this species (Whitehead, 1979), and detection should also result in rejection of the fruit. *Conotrachelus serpentinus* would therefore always have a low association with harvested 'Hass' avocados for export into the United States.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	C	Guidelines call for strict inspection, cutting, and culling of avocado fruit in the packinghouse to detect *C. aguacatae* and *C. perseae* (7 CFR § 319.56-30, 2011). Any *C. serpentinus* escaping detection in the field are highly likely to be detected and removed from the pathway in the packinghouse. Consequently, we decreased the previous rating (A1) from Low to Negligible, and the analysis of this pest stops here.

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.5. *Copturus aguacatae*

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, we did not analyze the consequences of introduction.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Copturus aguacatae*

Climatic suitability	*Copturus aguacatae* occurs in Mexico and as far south as Guatemala (Bravo-Monzon and Espinosa-Garcia, 2008; Engstrand et al., 2010; Waite and Barrera, 2002). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Zones 9-11. Additionally, the climate throughout Hawaii and Puerto Rico appear suitable for establishment of *C. aguacatae*.
Potential hosts at risk in PRA Area	The only known host of *C. aguacatae* is avocado (*Persea americana*) (Bravo-Monzon and Espinosa-Garcia, 2008; Waite and Barrera, 2002). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013), but may also be found in Texas (Crane et al., 2010). Avocados are also commercially

	grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within the regions determined to be suitable for establishment of *C. aguacatae*.
Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	*Copturus aguacatae* is an important pest of avocado in Mexico, reducing yields and potentially killing trees (Waite and Barrera, 2002).
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Copturus aguacatae* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	C	Larvae bore into the stems of avocado fruit and may be found in the stem close to the fruit, but this apparently only occurs under heavy infestations (PERAL, 2005). The systems approach outlined in section 1.4 includes specific measures for surveys and inspections to eliminate prevalence of this pest in the field. Also, stems associated with fruit for export to the United States must be less than ½ inch long (7 CFR § 319.56-30, 2011). Overall, then, *C. aguacatae* is likely to have a low association with harvested avocado fruit.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	C	Guidelines call for strict inspection, cutting, and culling of avocado fruit in the packinghouse (7 CFR § 319.56-30, 2011). Any *C. aguacatae* escaping detection in the field are highly likely to be detected and removed from the pathway in the packinghouse. Consequently, we

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			decreased the previous rating (A1) from Low to Negligible, and the analysis of this pest stops here.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.6. *Cryptaspasma perseana*

Based on the current systems approach used in Mexico for other quarantined pests of concern, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Cryptaspasma perseana*

Climatic suitability	*Cryptaspasma perseana* is distributed in Michoacán, Mexico, and central Guatemala (Gilligan et al., 2011). A comparison of that region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Zones 9-11. Additionally, the climates of Hawaii and Puerto Rico appear suitable for establishment of *C. perseana*.
Potential hosts at risk in PRA Area	The only known host of *C. perseana* is avocado (*Persea americana*) (Gilligan et al., 2011). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013),

	but may also be found in Texas (Crane et al., 2010). Avocados are also commercially grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within the regions determined to be suitable for establishment of *C. perseana*.
Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	As a newly identified species (Gilligan et al., 2011), the pest potential of *C. perseana* is unclear. Larvae in the fruit may easily be confused with that of *S. catenifer* (Gilligan et al., 2011), indicating some potential for similar damage to occur.
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Cryptaspasma perseana* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	MU	Even though only newly described, *C. perseana* was detected during avocado surveys for *S. catenifer* (Gilligan et al., 2011). The inspections currently required by 7 CFR § 319.56-30 (2011) for other avocado fruit pests such as *S. catenifer* are likely to also detect infestations of *C. perseana.* The addition of this species to the CFR requirements would therefore result in a low association with harvested fruit for export. Because it is a newly described species, we have some uncertainty about this conclusion.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	MU	The packinghouse procedures (culling, cutting, and inspections) currently required by 7 CFR § 319.56-30 (2011) for other avocado fruit pests such as *S. catenifer* are highly likely to also detect infestations of *C. perseana*. Adding

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			this species to the CFR requirements is therefore highly likely to remove the pest from the pathway. Thus, we decreased the previous rating (A1) by one level from Low to Negligible, and the analysis of this pest stops here.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.7. *Heilipus lauri*

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Heilipus lauri*

Climatic suitability	*Heilipus lauri* is only known to occur in Colombia and south-central Mexico (Castañeda-Vildózola et al., 2013). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Zones 9-11. Additionally, the climates in Hawaii and Puerto Rico appear suitable for establishment of *H. lauri*.

Potential hosts at risk in PRA Area	*Heilipus lauri* is an important pest of avocado (Castañeda-Vildózola et al., 2013; Waite and Barrera, 2002). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013), but may also be found in Texas (Crane et al., 2010). Avocados are also commercially grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within the regions determined to be suitable for establishment of *H. lauri*.
Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	Infestations of *H. lauri* may result in losses of up to 80 percent in avocado (Castañeda-Vildozola et al., 2013; Waite and Barrera, 2002).
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Heilipus lauri* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	C	*Heilipus lauri* is a major pest of avocado fruit in Mexico (Waite and Barrera, 2002), though it is not known to occur in Michoacân (Castañeda-Vildozola et al., 2013). The systems approach outlined in section 1.4 includes specific measures for surveys and inspections to reduce prevalence of this pest in the field (7 CFR § 319.56-30, 2011). Orchards in which *H. lauri* is detected would not be eligible for export certification. *Heilipus lauri* is therefore likely to have a low association with harvested 'Hass' avocados for export into the United States.
Risk Element A2: Likelihood of surviving post-harvest	Negligible	C	Specific guidelines indicate a strict policy of inspection, cutting, and

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
processing before shipment			culling of avocado fruit in the packinghouse (7 CFR § 319.56-30, 2011) that have been shown to be effective. Any *H. lauri* infesting harvested fruit are highly likely to be detected and removed from the pathway in the packinghouse. Based on this evidence, we decreased the previous rating (A1) by one level from Low to Negligible, and the analysis of this pest stops here.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.8. *Maconellicoccus hirsutus*

Maconellicoccus hirsutus is considered a reportable/actionable pest at all U.S. ports of entry (PestID, 2013). Reported as a pest of 'Hass' avocado in Mexico that may be associated with harvested fruit (CABI, 2011a; Sagarra and Peterkin, 1999), the PRA area at risk includes the continental United States, Hawaii, and Puerto Rico. Presence of *M. hirsutus* in Hawaii, Puerto Rico, and some portions of the continental United States reduces the potential endangered area to some portions of the continental United States as described below. No endangered area exists in either Hawaii or Puerto Rico.

We determined the overall likelihood of introduction to be Medium. We present the results of this assessment in the table below. We also determined that the establishment of *M. hirsutus* in the endangered area within the continental United States is likely to cause unacceptable impacts. We present the results of this assessment in the table below.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Maconellicoccus hirsutus*

Climatic suitability	*Maconellicoccus hirsutus* is present in many parts of Asia, Africa, Oceania, the Middle East, and the Caribbean and in some parts of the southern and western United States (CABI, 2012). Based on this distribution, we estimate that it may establish in the United States throughout Plant Hardiness Zones 7-11. *Maconellicoccus hirsutus* is already established outdoors in some states considered to be at risk in the continental United States. Each of these states report the use of biological control efforts to reduce or maintain impact levels below economic status. These states include California (Roltsch et al., 2006), Florida (Hoy et al., 2011), Georgia (Horton, 2008), Louisiana (LDAF, 2006), South Carolina (Chong, 2009), and Texas (Burns et al., 2007). *Maconellicoccus hirsutus* is also already established outdoors in Hawaii and Puerto Rico (Sagarra and Peterkin, 1999). Because of a lack of official control program (as defined by ISPM No. 5, IPPC, 2009), those areas are not endangered.
Potential hosts at risk in PRA Area	The pest feeds on a large number of hosts in various families, including ornamentals and native plants (CABI, 2012). Many of its hosts are widely distributed and abundant in the continental United States.
Economically important hosts at risk[a]	Numerous economically important hosts grow in Plant Hardiness Zones 7-11 in the United States, including citrus, avocado, cherry, plum, pepper, grapes, corn, beans and peas, eggplant, potato, cucumber, cabbage, squash, okra, and tomato (CABI, 2012).
Pest potential on economically important hosts at risk	Where it is found in the United States, *M. hirsutus* is an economically important pest (Aristizabal et al., 2012). In India, *M. hirsutus* has caused economic losses in cotton, grapevine, mulberry, and pigeonpea (CABI, 2012). These hosts occur in the United States in Zones 7-11.
Defined Endangered Area	Based on the current distribution of *M. hirsutus* in Hawaii and Puerto Rico and the lack of official control in those regions, we determined no endangered area exists for Hawaii and Puerto Rico. In addition, the outdoor establishment and lack of official control in CA, FL, GA, LA, SC, and TX negate the potential for these states to be considered endangered. Therefore, for this risk assessment, the endangered area is considered to be a wide range of crops and environmental plants only in states within Plant Hardiness Zones 7-11 where *M. hirsutus* does not occur: Alabama, Arizona, Arkansas, Delaware, Illinois, Indiana, Kansas, Kentucky, Maryland, Mississippi, Missouri, Nevada, New Jersey, New Mexico, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania,

Tennessee, Virginia, Washington, and West Virginia.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Maconellicoccus hirsutus* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	MC	Avocado is not a regular field host for *M. hirsutus*: many reports indicate that avocados are at risk (e.g., CABI, 2013; EPPO, 2005; Hoy et al., 2011), but documentation of *M. hirsutus* on avocado trees occurs in only a few references (e.g., Sagarra and Peterkin, 1999). Those references, however, simply record presence on the plant with no indication of damage or infestation levels. Because of the low association of *M. hirsutus* with avocados, we rated prevalence as Low.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Low	MC	*Maconellicoccus hirsutus* is a small, sessile external feeder (CABI, 2013). Inspection procedures outlined in Section 1.4 do not specify detection of small mealybugs, and are unlikely to reduce the prevalence of this species, so we did not change the previous rating.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	Low	MC	Transport and storage conditions as described in Section 1.4 are not likely to affect pest populations. We did not change the previous rating (A2).
Risk Element A: Overall risk rating for likelihood of entry	Low	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	Low	MC	The dispersing life stage of the pest has limited ability to disperse naturally. The sessile nature of *M. hirsutus* severely limits the chance of contacting hosts (Gullan and Kosztarab, 1997). Successful

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			establishment of these insects in a new environment can occur only when mobile forms (i.e., crawlers) are present on the imported fruit and these fruit are placed in close proximity to a susceptible host. Because those circumstances are highly unlikely to co-occur, *M. hirsutus* we rated this element Low.
Risk Element B2: Likelihood of arriving in the endangered area	High	C	More than 25 percent of the U.S. population lives in the endangered area.
Risk Element B: Combined likelihood of establishment	Medium	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Medium	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

Assessment of the consequences of introduction of *Maconellicoccus hirsutus* into the continental United States (i.e., the PRA area)

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Direct Impacts			
Risk Element C1: Damage potential in the endangered area	Yes	C	Crop production costs will significantly increase due to infestations of *M. hirsutus* (Hoy et al., 2011).
Risk Element C2: Spread potential	Yes	C	The distribution of *M. hirsutus* is rapidly expanding through the movement of infested commodities or passenger baggage, particularly in regions where it has recently been introduced (e.g., Culik et al., 2013; Sagarra and Peterkin, 1999).
Risk Element C: Pest introduction is likely to cause unacceptable direct impacts	Yes	N/A	

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Trade Impacts			
Risk Element D1: Export markets at risk	N/A	N/A	
Risk Element D2: Likelihood of trading partners imposing additional phytosanitary requirements	N/A	N/A	
Risk Element D: Pest is likely to cause significant trade impacts	N/A	N/A	
Conclusion			
Is the pest likely to cause unacceptable consequences in the PRA area?	Yes	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.9. *Paracoccus marginatus*

Paracoccus marginatus is a reportable/actionable pest at all U.S. ports of entry (PestID, 2013). Reported as a pest of 'Hass' avocado in Mexico that may be associated with harvested fruit (CABI, 2011a), the PRA area at risk includes the continental United States, Hawaii, and Puerto Rico. Despite that, we determined that no endangered area exists within those areas. We present the results of this assessment in the table below.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Paracoccus marginatus*

Climatic suitability	*Paracoccus marginatus* is a tropical pest. It has been established outdoors in Florida since 1998 (Miller et al., 1999), in Hawaii since 2004 (Heu et al., 2007), and Puerto Rico since 2001 (Pantoja et al., 2007). Based on the tropical distribution of *P. marginatus* in Asia, northern Africa, Mexico, Central America, and the Caribbean (Miller and Miller, 2002; Muniappan et al., 2009; Muniappan et al., 2008), we estimate that establishment may occur in Plant Hardiness Zones 10-11, as described by Magarey et al. (2008). Despite the lack of official control, and known movement of potential host plants from Florida to other regions (Miller and Miller, 2002), *P. marginatus* is not spreading in the United States, and it is likely already established in all of the regions suitable for population development.
Defined Endangered Area	Based on the current distribution of *P. marginatus* in the continental United States, Hawaii, and Puerto Rico and lack of official control in these regions, we determined that no endangered area exists.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

3.2.10. *Philephedra lutea*

We determined that no portion of Hawaii is likely to be endangered by *Philephedra lutea* because the pest does not pose a threat to any hosts of economic, environmental, or social importance in the PRA area. Because no endangered area exists, we did not analyze either the likelihood or consequences of introduction.

Determination of the portion of Hawaii endangered by *Philephedra lutea*

Climatic suitability	*Philephedra lutea* is present in Mexico, Guatemala, and the United States (Ben-Dov et al., 2013; Nakahara and Gill, 1985). In the United States, action is only required to Hawaii, the Virgin Islands, and the Pacific territories (PestID, 2013). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment could occur throughout Hawaii.
Potential hosts at risk in PRA Area	Potential hosts include *Codiaeum variegatum, Croton* sp., *Ficus* sp., *Magnolia* sp., and *Persea americana* (Ben-Dov et al., 2013), which are all present in Hawaii (Starr and Starr, n.d.).
Economically important hosts at risk[a]	In Hawaii, avocados are considered to be economically important (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	We found very little information about *P. lutea*. It occurs in some regions of the United States and Mexico, but is only known from a few native plants and was not economically important (Nakahara and Gill, 1985). Despite multiple mentions of this species more recently (e.g., García et al., 2004; Garcia et al., 2006; Rosenblueth et al., 2012) we found no evidence that this species could cause economic harm. Consequently, we concluded that the pest potential on economically important hosts at risk is negligible.
Defined Endangered Area	We determined that no portion of Hawaii is likely to be endangered by *P. lutea* because the pest does not pose a threat to any hosts of economic, environmental, or social importance in Hawaii.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

3.2.11. *Phytophthora citricola*

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of Puerto Rico endangered by *Phytophthora citricola*

Climatic suitability	*Phytophthora citricola* is present in California, and Mexico, Hawaii, Taiwan, New Zealand, Australia, Japan, Greece, Sri Lanka, United Kingdom, Italy, Mexico, Canada, and Argentina (Erwin and Ribeiro, 1996). Based on a comparison of this distribution with a global map of Plant Hardiness Zones (Magarey et al., 2008), we estimate that it could establish throughout Puerto Rico.

Potential hosts at risk in PRA Area	*Phytophthora citricola* has a wide host range of woody tree and shrub hosts (Erwin and Ribeiro, 1996). Potential hosts in Puerto Rico include *Citrus* spp., *Hibiscus* spp., *Persea Americana, Phaseolus vulgaris, Psidium guajava, Solanum lycopersicum,* and *Vitis vinifera* (Erwin and Ribeiro, 1996; NRCS, 2013).
Economically important hosts at risk[a]	*Persea americana* is an economically important crop in Puerto Rico (Crane et al., 2010).
Pest potential on economically important hosts at risk	*Phytophthora citricola* causes trunk canker, collar rot, and fruit rot on avocado and, in general, is an important soilborne pathogen worldwide (Erwin and Ribeiro, 1996; Bhat and Browne, 2007).
Defined Endangered Area	The endangered area encompasses avocado production throughout Puerto Rico.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Phytophthora citricola* into Puerto Rico via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	MC	Low-hanging fruit can be infected by irrigation water or by soil splash during heavy rains (Faber et al., 1997). Infected fruit may eventually fall from the tree (Fucikovsky and Luna, 1987). Since fruit is not the typical infection site and infected fruit may fall prior to harvest, we rated prevalence on the harvested commodity as low.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	MC	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse (7 CFR § 319.56-30, 2011). Symptoms on fruit from *P. citricola* often develop before harvest, and sometimes after harvest as fruit decay (Faber et al., 1997). Therefore, infected fruits are highly likely to be removed from the pathway by the post-harvest practices of inspection, cutting, and culling. No *Phytophthora* spp. have been intercepted with Mexican avocados permit cargo

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			(PestID, 2013). Consequently, we decreased the previous rating (A1) by one level from Low to Neglible, and the analysis of this pest stops here.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.12. *Phytophthora heveae*

Phytophthora boehmeriae has been reported on avocado in Mexico (Coria Avalos, 1985; Romero Cova and Solis Aragon, 1996; Teliz, 2000), but these reports were thought to be mis-identifications (Abad, 2009; Coffey, 2009), and recently the species found on avocado in Mexico was confirmed to be *Phytophthora heveae* (Abad, 2011; Ochoa-Ascencio et al., 2011). Some scientists think *P. heveae* is a synonym of *P. palmivora* (CABI, 2011a, 2011b) but they are actually in different clades (Kang, 2011). They also have morphological differences (Erwin and Ribeiro, 1996). *Phytophthora heveae* is reported in the continental United States (Farr et al., 2013, Erwin and Ribeiro, 1996), but not in Hawaii and Puerto Rico.

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of Puerto Rico and Hawaii endangered by *Phytophthora heveae*

Climatic suitability	*Phytophthora heveae* is present in Malaysia, New Zealand, New Guinea, Brazil, Ivory Coast, Australia, India, Guatemala, Taiwan, China, and the continental United States (Erwin and Ribeiro, 1996; Ko et al., 2006). A comparison of these regions with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment may occur throughout Puerto Rico and Hawaii.
Potential hosts at risk in PRA Area	Potential hosts in Puerto Rico and/or Hawaii include coconut (*Cocos nucifera*), eucalyptus (*Eucalyptus pilularis*), avocado (*Persea americana*), mango (*Mangifera indica*), Mexican yellow pine (*Pinus patula*), apple guava (*Psidium gaujava*), and cocoa (*Theobroma cacao*) (Erwin and Ribeiro, 1996; NRCS, 2013).
Economically important hosts at risk[a]	*Phytophthora heveae* causes disease on economically important fruit crops (avocados, coconuts, mangoes, cocao, guava, etc.) that are grown in Puerto Rico and Hawaii (Erwin and Ribeiro, 1996; NRCS, 2013).
Pest potential on economically important hosts at risk	*Phytophthora heveae* causes a tree canker and/or constriction of the trunk on avocado that leads to die-back and stunting, and potentially tree death (Erwin and Ribeiro, 1996; Menge and Ploetz, 2003). On avocado fruit, it causes a dark basal rot that extends into the flesh (Ochoa-Ascencio et al., 2011).
Defined Endangered Area	The endangered area encompasses avocado production throughout Puerto Rico and Hawaii.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Phytophthora heveae* into Puerto Rico and Hawaii via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Low	MC	*Phytophthora heveae* is a soilborne pathogen that typically causes bleeding cankers and root rots on *Persea americana* (Erwin and Ribeiro, 1996). Low-hanging fruit can be infected by irrigation water and splash during heavy rains (Ochoa-Ascencio et al., 2011; Erwin and Ribeiro, 1996). Diseased fruit may eventually fall from the tree (Ochoa-Ascencio et al., 2011). Since fruit is not the typical infection site and infected fruit may fall prior to harvest,

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			we rated prevalence on the harvested commodity as Low.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	MC	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse to detect various pests (7 CFR § 319.56-30, 2011). Symptoms on fruit often develop before harvest, so any harvested infected fruit are highly likely to be culled. No *Phytophthora* spp. have been intercepted with Mexican avocado permit cargo (PestID, 2013). Thus, we decreased the previous rating (A1) from Low to Negligible.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	Negligible	N/A	Typical shipping conditions for avocado seem unlikely to affect the pest population, so we did not change the previous risk rating.
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area			
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.13. *Pseudophilothrips perseae*

We determined the overall likelihood of introduction to be Medium. We present the results of this assessment in the table below. We determined that the establishment of *P. perseae* in the continental United States, Hawaii, and Puerto Rico is likely to cause unacceptable impacts. We present the results of this assessment in the table below.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Pseudophilothrips perseae*

Climatic suitability	*Pseudophilothrips perseae* is present in Chile, Guatemala, Honduras, and Mexico (Mound et al., 2010; Urias-Lopez et al., 2007). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Zones 9-11. Additionally, the climate throughout Hawaii and Puerto Rico appear suitable for establishment of *P. perseae*.
Potential hosts at risk in PRA Area	*Pseudophilothrips perseae* is a pest of *Persea* species (Mound et al., 2010), including avocado (Waite and Barrera, 2002). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013), but may also be found in Texas (Crane et al., 2010). Avocados are also commercially grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within areas suitable for establishment of *P. perseae*.
Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	*Pseudophilothrips perseae* is an "important pest" of avocado trees (Waite and Barrera, 2002), causing economic damage on fruits and leaves (Urias-Lopez et al., 2007).
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Pseudophilothrips perseae* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	High	MU	*Pseudophilothrips perseae* is an important pest in 'Hass' avocado production orchards in Mexico (Urias-Lopez et al., 2007). No standard industry practices have been indicated that may reduce the prevalence of thrips on the harvested commodity.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Medium	MU	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse to detect various insects (7 CFR § 319.56-30, 2011). These

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			inspection measures are highly likely to also detect external thrips present on the fruit. Therefore, we reduced the risk rating by one level to Medium.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	Medium	MC	Transport and storage conditions as described in Section 1.4 are not likely to affect pest populations. We did not change the previous rating (A2).
Risk Element A: Overall risk rating for likelihood of entry	Medium	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	Low	MC	The pest has a restricted host range. The host range of *P. perseae* is limited to *Persea* species (Mound et al., 2010), including avocado (Waite and Barrera, 2002).
Risk Element B2: Likelihood of arriving in the endangered area	High	C	More than 25 percent of the U.S. population lives in the endangered area.
Risk Element B: Combined likelihood of establishment	Medium	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Medium	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

Assessment of the consequences of introduction of *Pseudophilothrips perseae* into the continental United States, Hawaii, and Puerto Rico (i.e., the PRA area)

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Direct Impacts			
Risk Element C1: Damage potential in the endangered area	Yes	C	*Pseudophilothrips perseae* causes damage to fruits and leaves (Urias-Lopez et al., 2007). Losses as high as 40 percent have been reported.
Risk Element C2: Spread potential	Yes	C	*Pseudophilothrips perseae* has recently been spreading in Mexico (Urias-Lopez et al., 2007).
Risk Element C: Pest	Yes	N/A	

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
introduction is likely to cause unacceptable direct impacts			
Trade Impacts			
Risk Element D1: Export markets at risk	N/A	N/A	
Risk Element D2: Likelihood of trading partners imposing additional phytosanitary requirements	N/A	N/A	
Risk Element D: Pest is likely to cause significant trade impacts	N/A	N/A	
Conclusion			
Is the pest likely to cause unacceptable consequences in the PRA area?	Yes	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.14. *Scirtothrips aceri*

We determined the overall likelihood of introduction to be Low. We present the results of this assessment in the table below. We determined that the establishment of *S. aceri* in Hawaii and Puerto Rico is likely to cause unacceptable impacts. We present the results of this assessment in the table below.

Determination of the portion of Hawaii and Puerto Rico endangered by *Scirtothrips aceri*	
Climatic suitability	*Scirtothrips aceri* is present in Mexico, Central America, western continental United States and Chile (Hoddle et al., 2008; Waite and Barrera, 2002). A comparison of these regions with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment may occur throughout Hawaii and Puerto Rico.
Potential hosts at risk in PRA Area	Potential hosts in Hawaii and Puerto Rico include *Quercus* sp. (Hoddle et al., 2008), and *Persea americana* (Hoddle et al., 2002a; Johansen-Naime et al., 2003; Waite and Barrera, 2002).
Economically important hosts at risk[a]	Avocados are an economically important crop grown in Hawaii and Puerto Rico (Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	*Scirtothrips aceri* is listed as one of the most important thrips species infesting avocados in Mexico (Hofshi, 2001; Waite and Barrera, 2002).
Defined Endangered Area	The endangered area encompasses avocado production throughout Hawaii and Puerto Rico.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Scirtothrips aceri* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	High	MC	*Scirtothrips aceri* is one of the most important thrips species infesting avocados in Mexico (Hofshi, 2001; Waite and Barrera, 2002). No standard industry practices have been indicated that may reduce the prevalence of thrips on the harvested commodity.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Medium	MU	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse to detect various insects that may be contaminating the fruit (7 CFR § 319.56-30, 2011). External thrips on the fruit are also highly likely to be detected by those procedures, therefore, we lowered the risk rating to Medium.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	Medium	C	Transport and storage conditions as described in Section 1.4 are not likely to affect pest populations. We did not change the previous rating (A2).
Risk Element A: Overall risk rating for likelihood of entry	Medium	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	Low	MU	Known host plants include avocado for which it is considered a major pest (Hofshi, 2001; Waite and Barrera, 2002), and oak (Nakahara, 1997). Given this limited host range and the relatively limited ability for natural dispersal of thrips, the likelihood of coming into contact with host material is Low.
Risk Element B2: Likelihood of arriving in the endangered area	Low	MC	Less than 10 percent of the population (including the continental United States) lives in the endangered area.
Risk Element B: Combined likelihood of establishment	Low	N/A	

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Low	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

Assessment of the consequences of introduction of *Scirtothrips aceri* into Hawaii and Puerto Rico (i.e., the PRA area)

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Direct Impacts			
Risk Element C1: Damage potential in the endangered area	Yes	MU	Initially thought to be a non-pest in California (Nakahara, 1997), *S. aceri* has recently been described as one of the most important thrips species in avocado production (Hofshi, 2001; Waite and Barrera, 2002).
Risk Element C2: Spread potential	Yes	MU	Available information does not indicate that spread for *S. aceri* may be limited should it become introduced into Hawaii or Puerto Rico.
Risk Element C: Pest introduction is likely to cause unacceptable direct impacts	Yes	N/A	
Trade Impacts			
Risk Element D1: Export markets at risk	N/A	N/A	
Risk Element D2: Likelihood of trading partners imposing additional phytosanitary requirements	N/A	N/A	
Risk Element D: Pest is likely to cause significant trade impacts	N/A	N/A	
Conclusion			
Is the pest likely to cause unacceptable consequences in the PRA area?	Yes	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.15. *Scirtothrips perseae*

We determined the overall likelihood of introduction to be Low. We present the results of this assessment in the table below. Furthermore, we determined that the establishment of *S. perseae* in Puerto Rico is likely to cause unacceptable impacts. We present the results of this assessment in the table below.

Determination of the portion of the Puerto Rico endangered by *Scirtothrips perseae*

Climatic suitability	*Scirtothrips perseae* is found in Mexico, Guatemala, California, and Hawaii (Hoddle et al., 2002a). A comparison of these regions with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment may occur throughout Puerto Rico.
Potential hosts at risk in PRA Area	*Persea americana* is an important larval host plant for *S. perseae* (Hoddle et al., 2002a). Adults may also be found on other plant species when larval densities on avocado are high, though it appears the developmental host range is extremely limited (Hoddle et al., 2002a).
Economically important hosts at risk[a]	Avocados are an economically important crop grown in Puerto Rico (Crane et al., 2010).
Pest potential on economically important hosts at risk	*Scirtothrips perseae* is a pest of major economic significance in avocado production systems in California (Hoddle et al., 2002a). Up to 85 percent crop losses have been recorded (Waite and Barrera, 2002).
Defined Endangered Area	The endangered area for *S. perseae* encompasses all avocado production areas in Puerto Rico.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Scirtothrips perseae* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	Medium	MC	Mature avocado fruit is not a preferred feeding site. *Scirtothrips perseae* is more likely to be associated with immature fruit and leaves (CABI, 2013; Hoddle, 2002).
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Low	MU	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse to detect various insects that may be contaminating the fruit (7 CFR § 319.56-30, 2011). These inspection measures are highly likely to also detect external thrips on the fruit. Therefore, we lowered the risk

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			rating by one level from the previous rating.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	Low	MC	Transport and storage conditions as described in Section 1.4 are not likely to affect pest populations. We did not change the previous rating (A2).
Risk Element A: Overall risk rating for likelihood of entry	Low	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	Low	MC	*Scirtothrips perseae* are poor fliers (CABI, 2013; Hoddle et al., 2002b), and would have a limited ability to disperse naturally from an infested fruit to an avocado plant. In addition, the reproductive host range of *S. perseae* is restricted to *P. americana* (Hoddle et al., 2002a).
Risk Element B2: Likelihood of arriving in the endangered area	Low	MC	Less than 10 percent of the population (including the continental United States and Hawaii) live in the endangered area.
Risk Element B: Combined likelihood of establishment	Low	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Low	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

Assessment of the consequences of introduction of *Scirtothrips perseae* into Puerto Rico (i.e., the PRA area)

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Direct Impacts			
Risk Element C1: Damage potential in the endangered area	Yes	C	*Scirtothrips perseae* is a pest of major economic significance in California; infestations can result in 50-80 percent crop losses and significant increases in production costs (Hoddle et al., 2002a).

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element C2: Spread potential	Yes	C	Following the initial introduction of *S. perseae* in California, the pest quickly spread and was known to occur in about 95 percent of avocado production areas by 2002 (Hoddle et al., 2002a).
Risk Element C: Pest introduction is likely to cause unacceptable direct impacts	Yes	N/A	
Trade Impacts			
Risk Element D1: Export markets at risk	N/A	N/A	
Risk Element D2: Likelihood of trading partners imposing additional phytosanitary requirements	N/A	N/A	
Risk Element D: Pest is likely to cause significant trade impacts	N/A	N/A	
Conclusion			
Is the pest likely to cause unacceptable consequences in the PRA area?	Yes	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.16. *Sphaceloma perseae*

We determined the overall likelihood of introduction to be Low. We present the results of this assessment in the table below. We determined that the establishment of *S. perseae* in Hawaii is likely to cause unacceptable impacts. We present the results of this assessment in the table below.

Determination of the portion of Hawaii endangered by *Sphaceloma perseae*	
Climatic suitability	*Sphaceloma perseae* is present in the continental United States (Florida), parts of Latin America, Morocco, the Philippines, South Africa (Menge and Ploetz, 2003), Mexico (Fucikovsky and Luna, 1987, PestID, 2013) and Puerto Rico (C.M.I., 1986a; Stevenson, 1975). A comparison of these regions with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment may occur throughout Hawaii.
Potential hosts at risk in PRA Area	Avocado, the host of *Sphaceloma perseae*, is grown in Hawaii (NRCS, 2013).

Economically important hosts at risk[a]	Avocados are an important commercial crop in Hawaii (NASS, 2009).
Pest potential on economically important hosts at risk	*Sphaceloma perseae* is a severe problem in humid tropical regions where it causes losses due to fruit drop and lower market value of avocado fruit (Menge and Ploetz, 2003).
Defined Endangered Area	The endangered area encompasses avocado production throughout Hawaii.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Sphaceloma perseae* into Hawaii via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested commodity (= the baseline rating for entry)	High	MC	*Sphaceloma perseae* causes raised corky lesions on the fruit (Menge and Ploetz, 2003). Since 2005, there have been 219 permit cargo interceptions of avocado fruit from Mexico and hundreds more in baggage interceptions (PestID, 2013).
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Medium	MC	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse to detect various pests that may be contaminating the fruit (7 CFR § 319.56-30, 2011). *Sphaceloma perseae* is a pathogen of young tissues and fruit become resistant once they are half grown (Menge and Ploetz, 2003; Mossler and Crane, 2012); therefore, it is likely symptoms will be evident on fruit and subject to culling. However, since there are numerous *S. perseae* interceptions from Mexico in permit cargo since 2005 (PestID, 2013), not all fruit is being culled prior to shipment. We decreased the rating for the previous risk element (A1) by one level from high to medium.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	Medium	C	Transport and storage (see Section 1.4: Description of the pathway) are unlikely to positively or negatively affect pest prevalence in the commodity.

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element A: Overall risk rating for likelihood of entry	Medium	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	Low	MC	Avocado is the primary host for *Sphaceloma perseae* and is grown commercially and naturally in Hawaii (NASS, 2009; NRCS, 2013). Conidia can form on fruit in cool, moist weather and are carried to other hosts by wind, rain, and insects (passively) (Menge and Ploetz, 2003). Scabby fallen fruit are considered the primarily inoculum source for grove infections from year to year (Menge and Ploetz, 2003). Due to the passive means of natural dispersal, infected fruit (for consumption) shipped to Hawaii would need to be discarded in close proximity to other avocado hosts, and the host would need to have young susceptible tissues available for infection. For these reasons, the likelihood of coming into contact with host material in Hawaii is considered Low.
Risk Element B2: Likelihood of arriving in the endangered area	Low	MC	Less than 10 percent of the population (including the continental United States) lives in the endangered area.
Risk Element B: Combined likelihood of establishment	Low	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Low	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

Assessment of the consequences of introduction of *Sphaceloma perseae* into Hawaii

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Direct Impacts			
Risk Element C1: Damage potential in the endangered area	Yes	MU	*Sphaceloma perseae* is a severe problem in humid tropical regions,

Criteria	Meets criteria? (Y/N)	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
			where it causes losses due to fruit drop, lower market value of fruit, and creates infection points for other pathogens (Menge and Ploetz, 2003; Mossler and Crane, 2012). The tropical climate of Hawaii is likely to be conducive to *S. perseae*. Management involves cultural practices to reduce inoculum, planting tolerant varieties, and application of preventative copper sprays, which must be applied multiple times during the growing season (Menge and Ploetz, 2003; Mossler and Crane, 2012).
Risk Element C2: Spread potential	Yes	MC	*Sphaceloma perseae* has been introduced and spread throughout various countries of the world (Menge and Ploetz, 2003; Farr et al., 2013) and therefore is likely to spread in Hawaii.
Risk Element C: Pest introduction is likely to cause unacceptable direct impacts	Yes	N/A	
Trade Impacts			
Risk Element D1: Export markets at risk	N/A	N/A	
Risk Element D2: Likelihood of trading partners imposing additional phytosanitary requirements	N/A	N/A	
Risk Element D: Pest is likely to cause significant trade impacts	N/A	N/A	
Conclusion			
Is the pest likely to cause unacceptable consequences in the PRA area?	Yes	N/A	

[a] C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.17. *Stenoma catenifer*

Based on the current systems approach used in Mexico, we determined the overall likelihood of introduction to be Negligible. We present the results of this assessment in the table below. Because the likelihood of introduction is Negligible, no analysis of consequences of introduction was necessary.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Stenoma catenifer*

Climatic suitability	*Stenoma catenifer* can be found in Mexico, Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), and South America (Argentina, Brazil, Colombia, Ecuador, Guyana, Peru, and Venezuela) (CABI, 2013; Hoddle and Hoddle, 2008). A comparison of this region with USDA Plant Hardiness Zones (Magarey et al., 2008) indicates that establishment in the continental United States may occur in Plant Hardiness Zones 9-11. Additionally, the climate throughout Hawaii and Puerto Rico appears suitable for establishment of *S. catenifer*.
Potential hosts at risk in PRA Area	*Stenoma catenifer* is a major pest of avocados throughout its range (Hoddle and Hoddle, 2008). In the continental United States, avocado is primarily grown in California (NASS, 2009) and Florida (NRCS, 2013), but may also be found in Texas (Crane et al., 2010). Avocados are also commercially grown in Hawaii (NASS, 2009; NRCS, 2013) and Puerto Rico (Crane et al., 2010; NRCS, 2013). These areas all fall within the regions determined to be suitable for establishment of *S. catenifer*.
Economically important hosts at risk[a]	Avocados are an economically important crop grown in the continental United States, Hawaii, and Puerto Rico (Boriss et al., 2013; Crane et al., 2010; NASS, 2009).
Pest potential on economically important hosts at risk	Up to 90 percent avocado fruit loss has been documented (Waite and Barrera, 2002). Even in chemically treated production fields, 60-80 percent yield losses may occur (Hoddle and Hoddle, 2008).
Defined Endangered Area	The endangered area includes avocados grown throughout Hawaii and Puerto Rico, as well as in California, Florida, and Texas in the continental United States.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

Assessment of the likelihood of introduction of *Stenoma catenifer* into the endangered area via the importation of avocados from Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Likelihood of Entry			
Risk Element A1: Pest prevalence on the harvested	Low	MC	*Stenoma catenifer* is considered a major pest of avocado fruit in Mexico

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
commodity (= the baseline rating for entry)			(Waite and Barrera, 2002), though it is not known to occur in Michoacân (Castañeda-Vildozola et al., 2013). However, the systems approach outlined in section 1.4 includes specific measures for surveys and inspections to reduce prevalence of this pest in the field (7 CFR § 319.56-30, 2011). Even in commercial production fields using chemical treatments, damage due to infestations by *S. catenifer* may be significant (Hoddle and Hoddle, 2008). Regular inspections of the orchards as outlined in section 1.4 are highly likely to detect this species, thereby reducing the possibility of population establishment. Given the addition of *S. catenifer* to the CFR, any finds of *S. catenifer* in an orchard for export to the United States will result in a loss of registration as an approved grower. Thus, we think *S. catenifer* will only ever have a low association with these harvested 'Hass' avocados for export into the United States.
Risk Element A2: Likelihood of surviving post-harvest processing before shipment	Negligible	C	Specific guidelines indicate a strict policy of inspection, cutting, and culling of avocado fruit in the packinghouse (7 CFR § 319.56-30, 2011). Given the addition of S. catenifer to the CFR, infested fruit are highly likely to be detected and removed from the pathway in the packinghouse. Based on this evidence, the rating for the previous risk element (A1) was decreased by one level from Low to Negligible, and the analysis for this pest stops here.
Risk Element A3: Likelihood of surviving transport and storage conditions of the consignment	N/A	N/A	

Risk Element	Risk Rating	Uncertainty Rating[a]	Justification for rating and explanation of uncertainty (and other notes as necessary)
Risk Element A: Overall risk rating for likelihood of entry	Negligible	N/A	
Likelihood of Establishment			
Risk Element B1: Likelihood of coming into contact with host material in the endangered area	N/A	N/A	
Risk Element B2: Likelihood of arriving in the endangered area	N/A	N/A	
Risk Element B: Combined likelihood of establishment	N/A	N/A	
Overall Likelihood of Introduction			
Combined likelihoods of entry and establishment	Negligible	N/A	

[a]C=Certain, MC=Moderately Certain, MU=Moderately Uncertain, U=Uncertain

3.2.18. *Thrips palmi*

Thrips palmi is considered to be a reportable/actionable pest at all U.S. ports-of-entry (PestID, 2013). Present in Mexico and potentially associated with the harvested fruit of hass avocado (CABI, 2011a), the PRA area at risk for *T. palmi* encompasses the continental United States, Hawaii, and Puerto Rico. However, we determined that a full pest analysis is not needed for *T. palmi* because there is no endangered area in these regions. We present the results of this assessment in the table below.

Determination of the portion of the continental United States, Hawaii, and Puerto Rico endangered by *Thrips palmi*

Climatic suitability	*Thrips palmi* is distributed throughout tropical regions in Asia, Africa, South America, Oceania, and the Caribbean (CABI, 2013), including Hawaii, Puerto Rico, and southern Florida (Capinera, 2010; Seal, 2001). While *T. palmi* is an important greenhouse pest, and some concern exists that it may infest protected environments anywhere, outdoor establishment of permanent populations is likely to be restricted to tropical regions (Capinera, 2010). *Thrips palmi* is already established outdoors in Hawaii and Puerto Rico (Capinera, 2010). In the continental United States, permanent populations have only been documented in Florida south of Orlando (Capinera, 2010). Initially detected in 1990 (Capinera, 2010), it is not under official control. Surveys conducted over the last 20 years indicate that *T. palmi* is likely established throughout the climate zone appropriate for population development. The possibility of *T. palmi* populations overwintering in greenhouses and then moving

	outdoors in summer (e.g., Kawai, 1990; McDonald et al., 1999) has not been realized.
Defined Endangered Area	Based on the current distribution of *T. palmi* in the continental United States, Hawaii, and Puerto Rico and lack of official control in these regions, we determined that no endangered area exists.

[a] As defined by ISPM No. 11, supplement 2, "economically" important hosts refers to both commercial and non-market (environmental) plants (IPPC, 2011).

4. Conclusions

Of the organisms associated with avocados worldwide and reported in Mexico, we identified organisms that are actionable pests for the continental United States, Hawaii, and Puerto Rico and have a reasonable likelihood of being associated with the commodity following harvesting from the field and prior to any post-harvest processing. We further evaluated these organisms for their likelihood of introduction (i.e., entry plus establishment) and their potential consequences of introduction. Pests that meet the threshold to likely cause unacceptable consequences of introduction and receive an overall likelihood of introduction risk rating above Negligible are candidates for risk management. The results of this risk assessment represent a baseline estimate of the risks associated with the import commodity pathway as described in section 1.4.

Of the pests selected for further analysis, we determined that those identified in Table 3 are *not* candidates for risk management, either because no portion of the continental United States, Hawaii, or Puerto Rico is likely to be endangered by the pest, they do not meet the threshold to likely cause unacceptable consequences of introduction, and/or because they received a Negligible overall risk rating for likelihood of introduction into the endangered area via the import pathway. We summarize the results for each pest in Table 3.

All the other pests selected for further analysis are candidates for risk management, because they meet the threshold to likely cause unacceptable consequences of introduction, and they received an overall likelihood of introduction risk rating above Negligible. We summarize the results for each pest in Table 4.

Detailed examination and choice of appropriate phytosanitary measures to mitigate pest risk are part of the pest risk management phase within APHIS and are not addressed in this document.

Table 3. Summary for pests selected for further evaluation and determined *not* to be candidates for risk management.

Pest	**Reason the pest is *not* a candidate for risk management**	**Uncertainty statement (optional)[a]**
Conotrachelus aguacatae	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) determined to be an effective mitigation.

Pest	**Reason the pest is *not* a candidate for risk management**	**Uncertainty statement (optional)[a]**
Conotrachelus perseae	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) determined to be an effective mitigation.
Conotrachelus serpentinus	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) for other *Conotrachelus* species is highly likely to be effective for *C. serpentinus*.
Copturus aguacatae	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) determined to be an effective mitigation.
Cryptaspasma perseana	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) for other Lepidoptera species is highly likely to be effective for *C. perseana*.
Heilipus lauri	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) determined to be an effective mitigation.
Maconellicoccus hirsutus	No endangered area within Hawaii, Puerto Rico, and certain areas of the continental United States due to current distribution.	Only some areas of the continental United States are considered endangered due to the status of this pest as under consideration for state-mandated official control.
Paracoccus marginatus	No endangered area within the PRA area	
Philephedra lutea	No endangered area within the PRA area	Pest does not cause economic damage.
Phytophthora citricola	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) is highly likely to be an effective mitigation.
Phytophthora heveae	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) is highly likely to be an effective mitigation.
Stenoma catenifer	Negligible Likelihood of Introduction	Current systems approach (7 CFR § 319.56-30, 2011) determined to be an effective mitigation.
Thrips palmi	No endangered area within the PRA area	

[a]The uncertainty statement, if included, identifies the most important source(s) of uncertainty.

Table 4. Summary for pests selected for further evaluation and determined to be candidates for risk management. All of these pests meet the threshold for unacceptable consequences of introduction.

Pest	Likelihood of Introduction overall rating	Destination
Avocado sunblotch viroid	Low	Hawaii and Puerto Rico only
Maconellicoccus hirsutus	Medium	Continental United States
Pseudophilothrips perseae	Medium	Continental United States, Hawaii, and Puerto Rico
Scirtothrips aceri	Low	Hawaii and Puerto Rico only
Scirtothrips perseae	Low	Puerto Rico only
Sphaceloma perseae	Low	Hawaii only

[a]The uncertainty statement, if included, identifies the most important source(s) of uncertainty.

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7. Appendix A. Organisms identified to the genus level that are reported on *Persea americana* Mill in Mexico and that have actionable or undetermined regulatory status.

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
ARTHROPODS						
Coleoptera: Chrysomelidae						
Chrysodina sp.	PestID, 2011	US (Rouse, 1972)	US: U HI, PR: A	L (LeSage, 1991)	No	We found no evidence of presence in HI or PR.
Coleoptera: Curculionidae						
Conotrachelus sp.	PestID, 2011	US (CABI, 2013)	US: U HI, PR: A	F, L (CABI, 2011a)	Yes	We found no evidence of presence in HI or PR. However, the potential risk is assumed to be addressed through the analysis of *C. aguacatae* and *C. perseae*. No further information is needed.
Copturus sp.	Ebeling, 1959	US (Reinert and Howard, 1982)	US: U HI, PR: A	S (CABI, 2011a)	No	We found no evidence of presence in HI or PR.
Hyperodes sp.	PestID, 2011	US (Peck et al., 2007)	US: U HI, PR: A	L (PestID, 2011)	No	We found no evidence of presence in HI or PR.

[28] A=Actionable, U=Undetermined. If the genus does not occur in the continental United States, Hawaii, or Puerto Rico, the organism has actionable status. If the genus occurs in the continental United States, Hawaii or Puerto Rico, the organism has undetermined regulatory status, because we cannot know if the unidentified species is one that occurs in the continental United States, Hawaii or Puerto Rico.

[29] The plant part(s) listed are those for the plant species under analysis. If the information is extrapolated, such as from plant part association on other plant species, this is noted.

[30] "Yes" indicates simply that the pest has a reasonable likelihood of being associated with the harvested commodity; the level of pest prevalence on the harvested commodity (low, medium, or high) is qualitatively assessed in Risk Element A1 as part of the likelihood of introduction assessment (section 3).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Coleoptera: Scolytidae						
Corthylus spp.	Peña et al., 2002	US (CABI, 2013), PR (Capriles and Navarro, 1967)	US, PR: U HI: A	S (Peña et al., 2002)	No	We found no evidence of presence in HI.
Coleoptera: Tenebrionidae						
Blapstinus sp.	PestID, 2011	US, PR (Steiner, 2006), HI (Beardsley and Tuthill, 1959)	U	F, L (PestID, 2011)	Yes	Several *Blapstinus* species are considered non-reportable at all ports (PestID, 2013).
Hemiptera: Aleyrodidae						
Paraleyrodes sp.	PestID, 2011	US, HI, PR (Stocks, 2012)	U	L (PestID, 2011)	No	Several *Paraleyrodes* species are considered non-reportable at all ports (PestID, 2013).
Tetraleurodes sp.	Waite and Barrera, 2002	US, PR (Nakahara, 1995)	US, PR: U HI: A	L (Waite and Barrera, 2002)	No	We found no evidence of presence in HI. Several *Tetraleurodes* species are considered non-reportable at all ports (PestID, 2013).
Tetralicia sp.	PestID, 2011	US (Evans, 2007)	US: U HI, PR: A	L (PestID, 2011)	No	We found no evidence of presence in HI or PR. *T. ericae* is considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Trialeurodes sp.	PestID, 2011	US, HI, PR (Ghahari et al., 2009)	U	L (Barrera et al., 1998)	No	Several *Trialeurodes* species are considered non-reportable at all ports (PestID, 2013).
Hemiptera: Aphididae						
Greenidea sp.	PestID, 2011	US (Halbert, 2004), HI (Beardsley, 1993)	US, HI: U PR: A	L (PestID, 2011)	No	We found no evidence of presence in PR. Several *Greenidea* species are considered non-reportable at all ports except HI. Action may be required only to HI (PestID, 2013).
Hemiptera: Cicadellidae						
Idona spp.	Ebeling, 1959	US (Ebeling, 1959)	U	L (Peña et al., 2002)	No	We found no evidence of presence in HI or PR. *Idona minuenda* is considered non-reportable at all ports (PestID, 2013).
Scaphytopius sp.	Ebeling, 1959	US (CABI, 2013), HI (Beardsley, 1966), PR (Maes and Godoy, 1993)	U	L (CABI, 2011a)	No	Several *Scaphytopius* species are considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Hemiptera: Diaspididae[31]						
Abgrallaspis sp.	PestID, 2011	US, HI, PR (Ben-Dov et al., 2013)	U	F (PestID, 2011)	Yes	See footnote #30
Acutaspis sp.	PestID, 2011	US, HI, PR (Ben-Dov et al., 2013)	U	F (PestID, 2011)	Yes	See footnote #30
Diaspidiotus sp.	PestID, 2011	US, HI, PR (Ben-Dov et al., 2013)	U	F, S (PestID, 2011)	Yes	See footnote #30
Hemiberlesia sp.	PestID, 2011	US, HI, PR (Ben-Dov et al., 2013)	U	F, L, S (Watson, undated)	Yes	See footnote #30
Quadraspidiotus sp.	PestID, 2011	US (Alston et al., 2011)	U	F (PestID, 2011)	Yes	See footnote #30
Hemiptera: Psyllidae						
Trioza sp.	PestID, 2011	US (Mead, 2012), HI (Uchida and Beardsley, 1992)	US, HI: U PR: A	L (PestID, 2011)	No	We found no evidence of presence in PR. Several *Trioza* species are considered non-reportable at all ports (PestID, 2013).
Hymenoptera: Formicidae						
Atta sp.	CABI, 2011a	US (CABI, 2013)	U	L, F (CABI, 2011a)	No[32]	We found no evidence of presence in HI or PR. Several *Atta* species are considered non-reportable at all ports (PestID, 2013).

[31] Although armored scales may enter on commercial fruit for consumption, they are highly unlikely to become established via this pathway. Please see discussion in section 2.3 for a detailed explanation.

[32] *Atta* sp. is a surface pest (CABI, 2011a) and is unlikely to remain with the fruit through harvesting and processing.

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
PATHOGENS						
Alternaria sp.	Alvarez, 1976	US, HI, PR (CABI, 2013; UGA, 2011)	U	F, L (Alvarez, 1976)	Yes	Example: *Alternaria alternata* (Fr. : Fr.) Keissl.
Aphelenchoides sp.	Alvarez, 1976	US (CABI, 2013); HI (USDA-ARS, 2013); PR (McGawley et al., 1984)	U	R (Alvarez, 1976)	No	Several *Aphelenchoides* species are considered non-reportable at all ports (PestID, 2013).
Ascochyta sp.	PestID, 2011	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	F, L, St (PestID, 2011)	Yes	Several *Ascochyta* species are considered non-reportable at all ports (PestID, 2013).
Cephalothecium sp.	Alvarez, 1976	US (Yale and Johnstone, 1951); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Example: *Cephalosporium roseum* Oudem./ *Trichothecium roseum*
Ceratocystis sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	"Twigs" (Alvarez, 1976)	No	Several *Ceratocystis* species are considered non-reportable at all ports (PestID, 2013).
Cercospora sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (UGA, 2011)	U	L (Alvarez, 1976)	No	Several *Cercospora* species are considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Cladosporium sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Cladosporium* species are considered non-reportable at all ports (PestID, 2013).
Criconemoides sp.	Alvarez, 1976	US (Cordero et al., 2012); HI (USGS-PIERC, 2013); PR (Ferris, 2013)- *Criconemoides sphaerocephala* (For Puerto Rico)	U	R (Alvarez, 1976)	No	Several *Criconemoides* species are considered non-reportable at all ports (PestID, 2013).
Curvularia sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Curvularia* species are considered non-reportable at all ports (PestID, 2013).
Diplodia sp.	PestID, 2011	US (Farr et al, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	F, L (PestID, 2011)	Yes	Several *Diplodia* species are considered non-reportable at all ports (PestID, 2013).
Dorylaimus sp.	Alvarez, 1976	US (CABI, 2013); HI (USDA-ARS, 2013)	See remarks	R (Alvarez, 1976)	No	The genus *Dorylaimus* is listed as non-reportable (PestID, 2013).
Dothichiza sp.	Alvarez, 1976	US (Farr et al., 2013)	US: U HI, PR: A	St (Alvarez, 1976)	No	We found no evidence for Hawaii or Puerto Rico.

Pest name	**Evidence of presence on avocado in Mexico**	**Genus present in US, HI, PR?**	**Regulatory status[28]**	**Plant part(s) association[29]**	**On harvested plant part(s)?[30]**	**Remarks**
Dothiorella sp.	Alvarez, 1976	US (Farr et al., 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	F, St (Alvarez, 1976)	Yes	Puerto Rico referenced by *Botryosphaeria* name (synonym). Several *Dothiorella* species are considered non-reportable at all ports (PestID, 2013).
Erwinia sp.	Alvarez, 1976	US, PR (CABI, 2013); HI (USGS-PIERC, 2013)	U	F (Alvarez, 1976)	Yes	Puerto Rico referenced by *Pantoea* nam (synonym). Several *Erwinia* species are considered non-reportable at all ports (PestID, 2013).
Fusarium sp.	Alvarez, 1976	US (CABI, 2013); PR, HI (UGA, 2011)	U	F, R, St (Alvarez, 1976)	Yes	Several *Fusarium* species are considered non-reportable at all ports (PestID, 2013).
Gibberella sp.	Alvarez, 1976	Yes (CABI, 2013); HI (USGS-PIERC, 2013); PR UGA, 2010b)	U	F (Alvarez, 1976)	Yes	Several *Gibberella* species are considered non-reportable at all ports (PestID, 2013).
Gloeosporium sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Gloeosporium* species are considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Glomerella sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	St (Alvarez, 1976)	No	Several *Glomerella* species are considered non-reportable at all ports (PestID, 2013).
Gnomonia sp.	Alvarez, 1976	Yes (CABI, 2013); HI (USGS-PIERC, 2013)	US, HI: U PR: A	St (Alvarez, 1976)	No	No evidence found for Puerto Rico. Several *Gnomonia* species are considered non-reportable at all ports (PestID, 2013).
Helicotylenchus sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (USDA-ARS, 2013)	U	R (Alvarez, 1976)	No	Several *Helicotylenchus* species are considered non-reportable at all ports (PestID, 2013).
Helminthosporium sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Helminthosporium* species are considered non-reportable at all ports (PestID, 2013).
Hemicriconemoides sp.	Alvarez, 1976	US (CABI, 2013)	US: U HI, PR: A	R (Alvarez, 1976)	No	No evidence found for Hawaii or Puerto Rico Example: *Hemicriconemoides mangiferae* Siddiqi (limited U.S. distribution)

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Hoplolaimus sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (*Hoplolaimus puertoricensis*)	U	R (Alvarez, 1976)	No	Several *Hoplolaimus* species are considered non-reportable at all ports (PestID, 2013).
Linochora sp.	PestID, 2011	US (Farr et al., 2013)	US: U HI, PR: A	F, L (PestID, 2011)- single interception on fruit, most are leaves and not finding this host/pathogen assocation in the literature	Yes	No evidence found for Hawaii or Puerto Rico.
Macrosporium sp.	Alvarez, 1976	Yes (Farr et al., 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	St (Alvarez, 1976)	No	The genus, *Macrosporium*, is listed as non-reportable (PestID, 2013).
Marssonina sp.	Alvarez, 1976	US (Farr et al., 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Marssonina* species are considered non-reportable at all ports (PestID, 2013).
Meloidogyne sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (USDA-ARS, 2013)	U	R (Alvarez, 1976)	No	Several *Meloidogyne* species are considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Monilia sp.	Alvarez, 1976	US (Farr et al., 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	F (Alvarez, 1976)	Yes	
Monochaetia sp.	Alvarez, 1976	US, HI (Farr et al., 2013)	US, HI: U PR: A	St (Alvarez, 1976)	No	No evidence found for Puerto Rico. Several *Monochaetia* species are considered non-reportable at all ports (PestID, 2013).
Mycosphaerella sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Mycosphaerella* species are considered non-reportable at all ports (PestID, 2013).
Nectria sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	St (Alvarez, 1976)	No	Several *Nectria* species are considered non-reportable at all ports (PestID, 2013).
Ovularia sp.	Alvarez, 1976	US (Farr et al., 2013)	US: U HI, PR: A	R (Alvarez, 1976)	No	No evidence was found for Hawaii or Puerto Rico. Several *Ovularia* species are considered non-reportable at all ports (PestID, 2013).
Perizomella sp.	PestID, 2011	N/A	non-actionable (PestID, 2013)	N/A	N/A	

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Pestalotia sp.	Alvarez, 1976	US (Farr et al., 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Pestalotia* species are considered non-reportable at all ports (PestID, 2013).
Phoma sp.	PestID, 2011	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	F, L (PestID, 2011)	Yes	Several *Phoma* species are considered non-reportable at all ports (PestID, 2013).
Phomopsis sp.	PestID, 2011	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	F, L (PestID, 2011)	Yes	Several *Phomopsis* species are considered non-reportable at all ports (PestID, 2013).
Phyllachora sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (Alvarez, 1976)	No	Several *Phyllachora* species are considered non-reportable at all ports (PestID, 2013).
Phyllosticta sp.	PestID, 2011	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (PestID, 2011)	No	Several *Phyllosticta* species are considered non-reportable at all ports (PestID, 2013).
Phymatotrichum sp.	Alvarez, 1976	US (Farr et al., 2013); HI (CABI, 2013)	US, HI: U PR: A	R (Alvarez, 1976)	No	Example: *Phymatotrichum omnivorum*-considered non-reportable at all ports of entry (PestID, 2013)*;* No evidence found for Puerto Rico

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Polyporus sp.	Alvarez, 1976	US (Farr et al., 2013): PR (Stevenson, 1975); HI (USGS-PIERC, 2013)	U	Trunk (cortex) (Alvarez, 1976)	No	Several *Polyporus* species are considered non-reportable at all ports (PestID, 2013).
Prathigada sp.	Alvarez, 1976	US (Farr et al., 2013)	US: U HI, PR: A	St (Alvarez, 1976)	No	No evidence found for Hawaii or Puerto Rico.
Pratylenchus sp.	Alvarez, 1976	US (CABI, 2013); HI (USGS-PIERC, 2013); PR (USDA-ARS, 2013)	U	R (Alvarez, 1976)	No	Several *Pratylenchus* species are considered non-reportable at all ports (PestID, 2013).
Rhizoctonia sp.	Alvarez, 1976	US, HI (Farr et al., 2013); PR (Stevenson, 1975)	U	R (Alvarez, 1976)	No	All species of *Rhizoctonia* are considered non-reportable at all ports (PestID, 2013).
Rosellinia sp.	Alvarez, 1976	US, PR (CABI, 2013); HI (USGS-PIERC, 2013)	U	R (Alvarez, 1976)	No	
Rotylenchus sp.	Alvarez, 1976	US, PR (CABI, 2013); HI (USDA-ARS, 2013)	U	R (Alvarez, 1976)	No	Example for US, PR: *Rotylenchus bradys* (now *Scutellonema bradys*). Several *Rotylenchus* species are considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Sclerotinia sp.	Alvarez, 1976	US, HI (CABI, 2013); PR (Stevenson, 1975)	U	F (Alvarez, 1976)	Yes	Several *Sclerotinia* species are considered non-reportable at all ports (PestID, 2013).
Septoria sp.	Alvarez, 1976	US, PR (CABI, 2013); HI (UGA, 2010b)	U	L (Alvarez, 1976)	No	Several *Septoria* species are considered non-reportable at all ports (PestID, 2013).
Sphaceloma sp.	Alvarez, 1976	US (CABI, 2013); HI (Farr et al., 2013); PR (Stevenson, 1975)	U	F (Alvarez, 1976)	Yes	Several *Sphaceloma* species are considered non-reportable at all ports (PestID, 2013).
Stagonospora sp.	PestID, 2011	US (Farr et al., 2013); HI (USGS-PIERC, 2013); PR (Stevenson, 1975)	U	L (PestID, 2011)	No	Several *Stagonospora*species are considered non-reportable at all ports (PestID, 2013).
Stemphylium sp.	PestID, 2011	US (CABI, 2013); HI (UGA, 2010b); PR (Stevenson, 1975)	U	L (PestID, 2011)	No	Several *Stemphylium* species are considered non-reportable at all ports (PestID, 2013).
Thielaviopsis sp.	PestID, 2011	US (CABI, 2013); PR (Stevenson, 1975); HI (Gonsalves and Ferreira, 1994b)	U	Branches, trunk (cortex) (PestID, 2011)	No	Several *Thielaviopsis* species are considered non-reportable at all ports (PestID, 2013).

Pest name	Evidence of presence on avocado in Mexico	Genus present in US, HI, PR?	Regulatory status[28]	Plant part(s) association[29]	On harvested plant part(s)?[30]	Remarks
Trichodorus sp.	Alvarez, 1976	US, HI, PR (CABI, 2013)	U	R (Alvarez, 1976)	No	Several *Trichodorus* species are considered non-reportable at all ports (PestID, 2013).
Trichothecium sp.	Alvarez, 1976	US, HI, PR (Farr et al., 2013)	U	St (Alvarez, 1976)	No	Example: *Trichothecium roseum* (Pers. : Fr.) Link
Tylenchus sp.	Alvarez, 1976	US (CABI, 2013); HI (USDA-ARS, 2013)	See remarks	R (Alvarez, 1976)	No	*Tylenchus* sp. is listed as Non-reportable at all ports of entry (PestID, 2013)
Verticillium sp.	Alvarez, 1976	US, PR (CABI, 2013); HI (UGA, 2011)	U	R (Alvarez, 1976)	No	Example: *Verticillium albo-atrum*. Several *Verticillium* species are considered non-reportable at all ports (PestID, 2013).
Xanthomonas sp.	Vidales-Fernández, 2009	US (CABI, 2013); HI, PR (UGA, 2010a)	U	F (Vidales-Fernández, 2009)	Yes	Several *Xanthomonas* species are considered non-reportable at all ports (PestID, 2013).
Xiphinema sp.	Alvarez, 1976	US, HI (CABI, 2013)	US, HI: U PR: A	R (Alvarez, 1976)	Yes	Several *Xiphinema* species are considered non-reportable at all ports (PestID, 2013).